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ABSTRACT

This publication contains nine articles interded to enhance teachers' understanding of urban geography. The articles are reprinted from issues of the 1969 volume of the Journal of Geography. Urban studies has been one of the most rapidly developing fields of geography during the post World War II generation. There has been extensive research and interest in the phenomena of cities and metropolitan areas. In this, geography has shared with other social sciences many common concepts and methods, but has contributed a distinctive set of viewpoints and a unique focus: the organization of man's use of space and resources in the developing and functioning of urban settlements. Research in urban geography has contributed to man's understanding of the complex of interrelated urban phenomena. In addition, geographic concepts and viewpoints have had substantial practical application in city and metropolitan planning. Some of these geographic concepts and contributions to urban studies are examined in articles focusing on external relations of cities, form and structure of cities, land use and density patterns of cities, origin and pattern of development of urban black social areas, transportation, and the future and planning of cities. (Author/RM)

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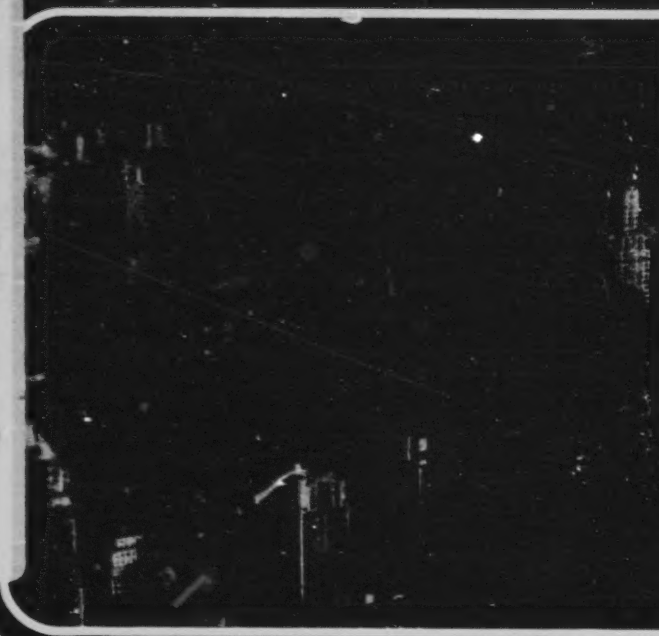

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A MODERN CITY --- ITS GEOGRAPHY

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PREFACE

Interest displayed by readers of the *Journal of Geography* in articles dealing with urban geography together with encouragement received from the Editorial Consultants prompted the Editor to think in terms of a sequence of articles on this topic. A conference with Harold M. Mayer, whose expertise in urban geography is recognized and respected, resulted in a commitment on his part to select nine topics and suitable authors. He also agreed to write three of the articles and to make his services available in the event an author could not be found for a particular topic. This resulted in four articles from his pen.

The articles in this publication appeared in the nine issues of the 1969 volume of the *Journal of Geography*. They are designed primarily to assist teachers in enhancing their understanding of the major facets of urban geography. It seems apparent also that students of geography and related fields will find the article suitable for the enrichment of insights in an academic area which is growing rapidly in importance.

Although the articles were written by six different authors, a unity in point of view is apparent. Any duplication which appears was essential for contextual completeness.

Herbert H. Gross
Editor

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Cities and Urban Geography

Harold M. Mayer

One of the most rapidly developing fields of geography during the generation which followed World War II has been that of urban studies. Currently, a very high proportion of the research effort and interest is in the phenomena of cities and metropolitan areas. In this, geography has shared with other social sciences many common concepts and methods, but has contributed a distinctive set of viewpoints and a unique focus: that which is primarily concerned with the organization of man's use of space and resources in the development and functioning of urban settlements. Research in urban geography has contributed to man's understanding of the complex of interrelated urban phenomena. In addition, the application of geographic concepts and viewpoints has produced substantial practical application in city and metropolitan planning.[1] In this and the eight papers to follow in this series, some of these geographic concepts and contributions to urban studies will be outlined.

"City" and "Urban"

What is a city? What is meant by "urban"? Although there are many common definitions of these terms, the geographer seeks a definition which is unambiguous, definite, and clear. If we are to compare one city with another, or a metropolitan area or urban agglomoration with another, or if we wish to compare the extent and character of urban population in one country or region with that in another, we need some criteria which can be applied in the measurement of these phenomena. There have been many attempts by geographers and others to develop definitions that can be used in comparative measurement, but none is completely satisfactory for all such purposes. The difficulty lies in the nature of the phenomena themselves, for, in spite of some common characteristics, cities and urbanization, as spatial phenomena and process, exhibit many interregional and international differences, rendering comparative studies of cities in different areas and at different times extremely difficult; yet the characteristics which all cities share render the attempts to compare them not entirely futile. There is a practical aspect to these attempts, as well as an academic: by learning of the successes and failures to solve urban problems in given cities, the probability of success or failure of similar solutions may be evaluated in terms of the

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extent to which the respective cities resemble, or do not resemble, each other with respect to the relevant characteristics. Solutions, for example, to the problems of housing in Swedish cities may not be entirely successful if applied to cities of the northeastern United States, because the political, cultural, racial, and economic backgrounds of the respective regions and countries differ in several important respects.

Nevertheless, cities throughout the world exhibit certain common characteristics which we identify as "urban," and which therefore help us to define the cities.

One of the definitions is administrative and legal. In most nations, and in each state in the United States, there is a set of criteria by which certain areas, called "cities" are designated by the sovereign power—the nation or state—to carry out certain functions and responsibilities, in return for which certain privileges are granted. In most of the British commonwealth countries, a City is such by royal decree, and the designation bears little, if any, relation to the population size of the place. Thus, the City of London, for example, embraces an area which constitutes only a very small portion of what in the United States would be considered a part of the central business district of the metropolitan complex. British usage of the term "City" thus is a purely historical and legal one; what Americans conceive of as a city is embraced in the British term "Town," while the Town in America has different meanings in different parts of the country. British "town planning" has the same meaning as the American term "city planning," while some British geographers and planners refer to the urban landscape as a "townscape."

In most American states, a city is a municipality—a governmental unit embracing a proscribed area with definitely-located boundaries, and with a minimum population which, if reached, entitles the area to apply for city status. Smaller urban units of government, with smaller populations, or larger ones which choose not to apply for city status, may incorporate in most states as municipalities with lesser status, such as villages, towns, or boroughs, the various designations differing from state to state. In many states, municipalities may be further differentiated by "class," depending upon population size, each class being granted certain rights and obligations. Depending upon the amount of "home rule" permitted municipalities in each of the various states, state enabling legislation delegates authority over certain matters to municipalities in varying degrees, depending upon the class. Thus, for example, in Illinois the state does not pass legislation applying to any particular city, but it designates "cities of the first class," the only such city being Chicago.

Rarely do the boundaries of the municipalities correspond to the actual boundaries of the respective built-up areas; cities are virtually always "over-bounded" or "under-bounded," more usually the latter, depending upon whether, in the first instance, substantial areas of land which are not "urban" in character are included within the municipal boundaries, or, in the second instance, there is "overspill" of urban character beyond the municipal boundaries. Areas can, and frequently are, added to municipalities by annexation, and most cities have expanded their extent many times as the population grows with the urbanization of land beyond the older boundaries. Thus, in 1854 Philadelphia city and county were consolidated, expanding the extent of the city several-fold, but there have been no annexations to Philadelphia since then. Other major American cities which once expanded by

consolidating with their counties include St. Louis and San Francisco, and, more recently, Nashville, Tennessee, and, for certain functions, Miami (Dade County), Florida. Such consolidation is rare, however. More commonly, cities add territory by piecemeal annexation, usually in order to provide municipal services and controls to areas beyond the previous borders, or to take in commercial or industrial areas, existing or prospective, which would furnish an enhanced tax base while at the same time not requiring substantial expenditures for extension of municipal services, such as schools, which account for more costs in most urban areas than do any other municipal functions. Factories and shops do not produce children, but they do produce substantial shares of the municipal tax revenues.

Except in the Southwestern United States, where cities such as Dallas, Houston, El Paso, Phoenix, and Tucson have more than doubled their municipal areas by annexations in recent years, it has become increasingly difficult for most cities to expand their administrative boundaries by this means. One reason is that many people, business establishments, and industries have located, and continue to locate, outside of the areas of the central cities, but still within convenient reach of them, in order to escape some of the obligations of internal location, such as supporting the many services which central cities must supply for the respective metropolitan areas, and also to avoid the pressures of congestion, pollution, and social pathology associated with high central densities of population, traffic, and activity, including the high land values which reflect the mutual convenience of such high densities. In other words, a locational decision within an urban complex reflects the respective weights which, in each instance, are given to central convenience but high density on the one hand, and peripheral amenity and low density on the other. centripetal, or centralizing forces and centrifugal, or decentralizing forces are in balance, with the fulcrum at different locations for each function or establishment at the time the locational decision is made. Since there is a limit to the number and intensity of functions which can occupy any given area, beyond which "scale diseconomies" such as congestion and high land costs result, urban growth tends to take place at the outer edges of the built-up area, the result being peripheral expansion.[2]

As expansion takes place on the edges of the previously built-up urban area, it is not long before the need for services and facilities which are provided by local governments is manifest. Schools, paved streets, utilities, fire and police protection, and other services must be provided, and they cannot be provided efficiently if the population density is too low, or if effective municipal government does not cover the area. Thus, there is a lower limit, or threshold, under which "urban" conditions do not constitute characteristics of an area, and which is necessary for effective provision of many needed facilities and services.

This brings us to another form of definition of "city" and of "urban," based upon a minimum density.

As we drive through an urban complex, or inspect an air photo of one, we can readily identify variations in density of buildings, streets, and both working and residential population. In most "western" cities, the density drops off very sharply from the core or center, with the decline in density decreasing at a decreasing rate as we move outward; this typical pattern is described mathematically as a negative exponential curve.[3] At some distance from the city center, the density is so low that it can no longer be considered typically urban;

here the urban area ends. We can draw contours of equal density around the city cores, and one of these contours can be used to describe the location of the outer limit of the urbanized area. For this purpose, we can use residential population —although with respect to this measure there tends to be a "crater" in the middle where intensive non-residential land uses tend to outbid the residential—or we can use some ratio of building volume or percent of land covered by structures, or, perhaps, traffic volume, or land costs. In nearly every city, these various density measures are highly correlated; any one greatly influences all or most of the others, and the patterns which result are very similar.

The concept of the density threshold has been used by governmental agencies in defining, for example, the "urbanized areas" surrounding each central city with at least 50,000 population in 1950, and again, with some slight changes in measurement criteria, in 1960. Thus, it was found that, in the United States, there is a high correlation between the contours representing the outer limits of a typical "urban" density of streets (whether rectilinear or not), a housing density of about 500 units per square mile, or a residential population of roughly 2,000 per square mile. Lower than these limits indicates nonurban status, although, as mentioned previously, the administrative municipal limits rarely if ever coincide with these density contours.

The pre-industrial city, whether in the past or at present in some non-industrialized parts of the world, was perhaps more easily defined in physical and functional terms than the modern city. Before the advent of strong national governments, the city-state was common; in the middle ages the feudal estate was somewhat analogous. In each instance, the settlement was more or less economically self-contained, and it had to provide for its own defense. It was a center of government, of economic activity, and of defense. Not uncommonly it was walled; within the walls and gates was urban, outside was not. With growth of population, not all citizens could locate within the walls, so "sub-urbs" developed outside, often performing trade functions as well as serving as residential locations for the population which could not be accommodated inside.

With industrialization and the advent of modern transportation, and especially the development of large national areas, the old concept of a dichotomy between "urban" and "nonurban" or rural has been breached. Figuratively, as well as literally, the walls have come down, and the distinctions between urban and rural are losing much of their former significance. Until the past few decades, urban development had to take place along lines of mass transportation of people and goods, and peripheral expansion of urban areas, along good transportation, was characterized by clear-cut distinctions between the areas which were urbanized and those which were not. Transportation made the difference; it not only permitted urban expansion, but it also permitted extremely high concentrations of activities and people to develop where the routes converged; this was a cause-and-effect relationship reciprocally. With the ubiquity of the automobile, truck, and modern highways, accessibility to good transportation is still important in the process of development of the urban pattern, but it takes different forms. Many industries no longer need to be located on navigable waterways, or alongside railroads to receive and ship goods; inter-modal transportation, with break-of-bulk at intermediate transfer points or "interfaces," or, of increasing importance, the elimination of much goods handling at interfaces by development of containers interchange-

able between highway, railroad, water, and even air carriers, has made locations much more footloose for most industries than was formerly the case. Similarly, shopping locations and residential development no longer need be entirely dependent upon large-scale mass transportation, so that many more locations are available for development. Densities, in the western world, are declining almost everywhere, and the cities are spreading out at an ever-increasing rate, but with no decrease in accessibility. The urbanized areas, therefore, are expanding at a rate even more rapid than the rapidly expanding urban population. In the United States, it is anticipated that if present trends continue, the amount of land occupied by urban settlement will double every twenty years.[4] The resulting urban "sprawl" represents a challenge to governments at all levels, from national to local, to find ways of guiding and controlling urban growth in order to maximize opportunities for all potential land uses to locate properly, and in the right amounts, for maximum efficiency and to provide for the maximum amenity and aesthetic satisfactions.[5]

The processes of guiding and controlling the patterns of urban land use have been the subject of much experimentation in recent decades, with the expansion of the concern of government with urban problems, the development of comprehensive city and metropolitan planning, and the adoption of various forms of regulation such as subdivision controls and zoning. None of these have been completely successful, and the problem still remains unsolved of how to provide a desirable degree of guidance and control of urban land development while at the same time retaining the maximum possible scope for the interplay of market forces in the traditional American free enterprise system. The guidance and control of patterns of urban growth, however, are enormously complicated by the proliferation of local governmental units and the fragmentation of the functional geographic urban areas into many local governmental jurisdictions. There are currently over 18,000 local governments in the United States—cities, towns, villages, and boroughs—most of them in the 230-odd metropolitan areas which are discussed later, in addition to special-purpose districts in at least equal number: school districts, park districts, sanitary districts, forest preserve districts, drainage districts, flood control districts, mosquito abatement districts, transit authorities, port authorities, housing authorities, and others.[6] Only school districts, among these, have decreased in number; for in the case of school districts it has been recognized that a certain minimum population and economic support, beyond reach of very small governmental units, is required in order to finance and operate adequate facilities with adequately qualified personnel. The study of the spatial aspects of inter-governmental relations and organization within urban areas is a field in which a few geographers have recently begun to produce significant studies, and it presents major opportunities for research and application in the future.

Thus, the problem of defining "urban" and "city" in areal or spatial terms is greatly complicated by the present patterns of government, with fragmentation of urban units in a geographic sense. On the other hand, these local governmental units, even though rarely coinciding with functional units in most geographic senses, are significant, for they represent organizational units which, in themselves, represent internal homogeneity with regard to certain policies, practices, and political and fiscal situations which are geographically significant, in spite of the fact that they make more difficult the recognition of larger geographical units of which they are a part.

Geographers have long recognized that the concept of "city" cannot be exclusively concerned with the administrative or jurisdictional municipal unit, and that most cities, in a functional sense, transcend political boundaries. A major professional concern of some geographers has been to set up and apply criteria for delimiting and describing the functional city, as distinguished from the administrative city. In this process, the practical problems of collating statistics for various areas, with comparability of criteria and measurements among such urban areas from place to place and time to time, has been, and is, a major concern. The problem is complicated by the fact that, in most urban areas, a decreasing proportion of the population and economic activity is located in the central city, and in most central cities both are suffering an absolute decline. In a rapidly increasing proportion of the metropolitan areas, the suburbs and unincorporated fringe areas now contain larger residential populations than do the respective central cities, while at the same time commercial and industrial activities are increasing both relatively and absolutely in the suburban areas. These trends have been enormously accelerated by the ubiquity of highway transportation, with its flexibility, producing a much greater freedom of choice among locations than was ever before possible.

The metropolitan area, in some ways, constitutes the geographic city. These areas consist of one or more "central cities," together with suburban and fringe areas which are related functionally to the central city. The Federal agencies define Standard Metropolitan Statistical Areas, of which there are approximately 230, as consisting of a central city, or cities, with minimum population of 50,000, together with counties having functional inter-relations, as measured mainly by commuting patterns, with the country containing the central city. Thus, the concept of the labor-market area, or "commuter shed," is basic to the defining and delimitation of an urban unit. Such a unit contains the territory and population which is essentially dependent upon the central city for many services. In spatial terms, the component portions of metropolitan areas are mutually inter-related, and for many purposes the metropolitan area constitutes a more suitable unit for geographic study than does the central city alone.

A metropolitan area, then, is a geographic, functional city, and for many purposes may be regarded as the basic areal urban unit.

Yet the concept of the metropolitan area, too, like that of the administrative or municipal city, has certain serious shortcomings.

One set of shortcomings in defining metropolitan areas arises from the use of the statistical areal units. In the United States, the county is the basic areal unit for which statistics are compiled and tabulated; metropolitan areas are defined as consisting of one or more counties. In many instances, the urbanized area within a county may be located only in a small portion of the county, the rest of which has very little population or development, yet the entire county is included within the metropolitan area. Thus, the unit statistical area, the county, may be far from homogeneous with respect to the essential urban characteristics. This is a typical example of the use for geographic purposes of what has been called "modifiable units," or areas which, variously delimited and used in differing combinations, produce differing areal definitions.[7] For example, the San Bernardino-Riverside-Ontario, California, Standard Metropolitan Statistical Area, the largest in the United States, consists of over 27,000 square miles, an area con-

siderably larger than all of southern New England, because San Bernardino County, whose population is nearly entirely confined to the southwestern corner, the rest being virtually uninhabited desert, must, by definition, be included in its entirety. Similarly, St. Louis County, Minnesota, a part of the Duluth-Superior Standard Metropolitan Statistical Area, includes much wilderness and extends for about 150 miles northward from Lake Superior to the Canadian border.

By no stretch of the imagination could the wilderness of the Mohave Desert or the northern Minnesota arrowhead be considered as urban or metropolitan in inherent characteristics, yet the rule that whole counties must be included within metropolitan areas if any part of them is metropolitan, produces such anomolous situations.

Recently, with the increased federal participation in the financing of many programs in urban areas, including highways, mass transit, open space land acquisition, urban renewal, and sewer and water facilities among others, the pressures to provide comprehensive metropolitan planning have increased. Since 1965, comprehensive plans, prepared by metropolitan regional agencies, have been required as prerequisites for local assistance by the federal government, which has at the same time provided matching funds to set up and operate such metropolitan planning agencies. These agencies, however, are not substitutes for metropolitan government, which, in most parts of the United States, the electorate is unwilling, as yet, to accept. The lack of such acceptance springs largely from the pervasive trend of people and commercial and industrial establishments to move away from the central cities toward the suburbs and outer portions of the metropolitan areas. The vacuum thus created in the inner portions of cities tends to be filled by the recent in-migrants who, at least in many northern cities, tend to be members of minority groups, predominantly Negro. These in-migrants, having been long disadvantaged educationally and culturally, are least able to command the better and newer housing available on the outskirts of the respective urban areas, which, in turn, expand as the result of the peripheral growth of the city. Thus there tends to be a series of conflicts of interest between the inner city, or the central city, on the one hand, and the "middle class" areas on the edge of the city and in the suburbs beyond. This is commonly reflected in political differences, with the central cities tending to reflect the more liberal attitudes of the minorities as the proportion of central city population which they represent increases. It is not at all unexpected that Cleveland, Gary, and Washington have Negro mayors; in earlier generations many of the city governments were predominantly reflections of the succession of ethnic and national in-migration patterns. On the other hand, the suburbs tend to, on the whole, reflect the attitudes of those who have "arrived" economically and socially, and who resist the assimilation of the more recently urbanized in-migrant populations. Zoning, for example, as an instrument of land-use control, has frequently been misused as an instrument of economic segregation, and hence ethnic segregation in many suburban areas, by providing minimum lot sizes and density standards which only the more affluent could attain, thereby excluding peoples whose economic status tended to be lower.[8]

These city-suburban differences, of course, are reflected in resistance to metropolitan government and the continuation of proliferating local governments within metropolitan areas. In order to overcome some of the consequent ineffi-

ciencies and provide for the multiplicity of services and facilities which are the responsibilities of local governments, many devices short of comprehensive metropolitan government are being developed. One such device is the special-purpose government, in many instances functioning in a geographic area which does not coincide with any of the areas of local government, but dealing with problems of metropolitan scope beyond the ability of local governments. Among the early noteworthy examples are the Metropolitan Sanitary District of Greater Chicago and the Port of New York Authority, the latter representing an early noteworthy example of a government set up across state boundaries by interstate compact. Special-purpose governments, however, have certain shortcomings; among them are the lack of coincidence of boundaries with local governments and often with each other, the tendency to add to the proliferation of governmental units, and, in some instances, the interposition of an additional governmental unit without direct control by the electorate. Many of the governmental and administrative problems of cities and metropolitan areas arise from an essentially geographic concern, namely, the determination of the nature and extent of those functions which are best dealt with locally and those which are of extra-local regional concern. For example, local access streets should be the responsibility of the local community, but regional expressways must be planned, built, and operated by a regional or larger unit of government. Similarly, local parks and regional parks must be differentiated. Schools constitute major problems in this regard; the different standards of inner-city and suburban schools have been adequately documented, and few people are unaware of the problems in this regard.[9] To the geographer, problems such as these constitute interesting and important challenges: to what extent should the planning, building, and operation of facilities and services be localized, and to what extent and in what manner—and especially within what area—should these facilities and services be the concern of the entire metropolitan region, or of major portions of it? How and by what criteria can determinations be made of the degree and areal extent of involvement of each level of government appropriate to the problem? How can local autonomy be preserved for matters of local concern and at the same time assure that regional and metropolitan concerns can be reconciled with the local ones?

Short of metropolitan government, and in addition to regional special-purpose governments, many official and unofficial devices are being tried to coordinate urban functions in order that metropolitan areas may overcome the deficiencies of intergovernmental fragmentation and function as urban units. In the past two decades, many metropolitan areas have set up comprehensive transportation studies as prerequisite to planning of highway and transit systems; since 1965 these operations have been required, as previously mentioned, by the federal government. But it was soon realized that projections of traffic trends were inadequate, and that circulation patterns merely reflect land-use patterns, because it is the land uses which generate traffic. Many of the transportation study agencies thus evolved into comprehensive regional and metropolitan planning agencies, concerned not only with transportation and land-use patterns, but also with economic and social planning within the respective areas. The professional planners themselves, through such organizations as the American Institute of Planners, have formally recognized the broadening of their responsibilities and the scope of their profession, to include social and economic planning

along with the physical. Geographers, likewise, are increasingly concerned with the spatial aspects of social and economic conditions and problems, many of which concentrate heavily in urban areas.

To coordinate planning and its effectuation, then, a variety of new organizational forms is evolving, and these constitute, in their spatial aspects, appropriate subjects for geographic investigation. Metropolitan comprehensive government is an ultimate solution in some instances, but, short of that, comprehensive regional and metropolitan planning agencies, special-purpose regional governments, informal and formal councils of government, and intergovernmental arrangements for purchasing or leasing of facilities and services, as well as pooling arrangements are all effective in various situations. The analysis and planning of governmental and inter-governmental arrangements in their spatial aspects within urban areas constitute a set of challenges of great prospective opportunity to the geographer; very likely these problems will constitute a new frontier of geography in the near future.

Megalopolis: Inter-Metropolitan Coalescence

Just as the traditional concept of the city as a unit of spatial organization of urban areas has largely been superceded by the concept of the metropolitan area, so the metropolitan area is itself inadequate as a descriptive device for contemporary and prospective patterns of urbanization. With respect to many functions, the metropolitan areas are not discrete functional areal units; a more comprehensive and larger unit has had to be developed to describe groups of metropolitan areas with overlapping functions.

Modern transportation is largely responsible for the growth of super-metropolitan conurbations. Transportation and land use are but two sides of the same coin, one static, the other dynamic. Urban land is useful primarily because of its accessibility to other land. There is a complementarity among land uses which gives rise to cities, and, at the local scale, there is a complementarity among the component functional areas and establishments within cities and metropolitan regions.[10] Transportation is one of two forms of mutual accessibility among land uses and establishments; it overcomes the friction of distance, but at a cost. The other form of accessibility is mutual proximity, which, at the cost of high-value land and high density, reduces or eliminates the necessity for providing transportation. Thus, the dichotomy of transport costs and land costs is reflected in the balance between centralizing and decentralizing forces, previously mentioned.[11] Geographers, land economists, sociologists, and others have evolved many idealized forms of spatial patterns to describe urban structure and growth, but all of them are based upon a balance between the two forms of accessibility: mutual proximity on the one hand and transportation on the other. Transportation—measured by traffic flows—depends, in turn, upon complementarity in which each area served produces specialized goods and/or services which are utilized elsewhere. In cities, the result is a functional differentiation of local areas; among cities, modern transportation and communication makes possible specialization, so that each city in a group or set of cities—such as a conurbation—does not need to perform all of the urban functions in equal degree, providing that interchange of people and services, as well as goods, can take place among the areas or cities within the group.[12] A common form of this in the modern city is the separation of working and residential areas, giving rise to the daily commuting between them.

As transportation improves—such as with the development of modern express highways—the area accessible within a given time-cost limit from any given point increases. This produces a greater flexibility of movement. Whereas a relatively short time ago, cities were highly concentrated, with radial transportation patterns focusing upon the core of the city, now the patterns of traffic flow and accessibility tend to be more diffuse and the densities of development lower, while the character of the urban functions within the cores is also changing. With respect to many activities, the central cores of the cities are rapidly becoming less important. At the same time, densities are becoming less, land is being absorbed by urbanization at an accelerating rate, and new nodes or foci of accessibility, such as regional shopping centers and industrial parks, are developing with reduced dependence upon access to the old city cores.

But even with modern transportation, equal access cannot be provided to all areas, and the form and shape of the urban pattern is still, no less than formerly, controlled in large measure by the pattern of transportation routes. Multiple nuclei, rather than a single dominant core, constitute the pattern of the modern city. Furthermore, the city does not spread with equal density or equal rapidity in all directions; those areas with best transportation access tend to develop more rapidly, and generally with higher densities than those less well provided with transportation access. Formerly, cities tended to develop a star-shaped pattern, with higher densities and earlier development along radial railroads, rapid transit lines, or trolley lines. More recently, with the ubiquity of highways, automobiles, and trucks, the interstitial areas between the older radial prongs of growth tended to fill in, generally, however, at somewhat lower densities than the older radial prongs. The outlines of the urbanized areas thus tended to depart from the star-shaped patterns characteristic of a few decades ago and to assume somewhat more circular patterns. More recently, however, with the advent of the express highway, the tendency has been for the development of axial "corridors" along such routes of maximum accessibility, with higher density of development closest to such routes, and especially to the intersections of such routes. Indeed, the development of such "corridors of high accessibility" has been a major physical element in the recently-published comprehensive plans of a number of cities and metropolitan areas. Serving as the axes along which such corridors are expected to develop are efficient transportation routes, including various combinations of railroads, high-speed rail rapid transit lines, and express highways.[13]

Such corridors, however, are not confined to within the limits of individual metropolitan areas. With efficient high-speed transportation of people and goods, the expanding tentacles of urbanization of cities and metropolitan areas formerly separated by many miles tend to coalesce. The pressures for lower densities and consequent increasing amounts of urbanized land tend to expand along the lines of least resistance: the most efficient transportation routes. As the tentacles along these routes connecting adjacent cities and metropolitan areas extend toward each other, they eventually form more-or-less continuous chains of urban development.[14] Cross-commuting, and functional specialization among the several or many cities forming such chains or clusters gives rise to common labor-market and housing-market areas; super-cities, transcending metropolitan area boundaries, thus tend to develop.

To this concept of the multi-nodal inter-metropolitan super-city, whether ar-

ranged as a cluster, or lineally along a corridor, the term Megalopolis has been applied.[15] The term is by no means a new one; it is derived from the Greek "mother city," and was first used a half-century ago by Patrick Geddes to describe an urbanized region.[16] Popularized as a generic term by Lewis Mumford,[17] it was adopted as a proper noun by Jean Gottmann[18] to describe the area between Boston and Washington, which, in fact, had developed even in colonial times as a chain of cities at the head of navigation for ocean-going vessels along the "fall line" marking the boundary between the Piedmont hard-rock area and the Atlantic coastal plain. When effective land transportation developed to replace coastal water transportation in the area during the late nineteenth century, the cities were linked by heavily-trafficked main-line railroads, and later by express highways and by shuttle airlines, all of which carry the heaviest volumes of inter-city traffic in North America. With these efficient transportation links, the urbanization spread along the axis, and the adjacent tentacles coalesced, eventually merging the older nodes into a lineal city.[19]

Many other "megalopolises," consisting of clusters or lineal arrangements of cities are recognized. Cross-commuting among cities fifty or more miles apart is now quite common, and a new form of urban structure is emerging. Meanwhile, the multi-nodal cluster type of super-city has its prototype in southern California, while the Boston-Washington axis constitutes the classic example of a lineal inter-city corridor. The federal government, in fact, now officially recognizes the new urban corridor form, for the so-called "Northeast Corridor" is the scene of a comprehensive series of experiments in high-speed intercity transportation.[20] Actually, this program springs directly from the work of Jean Gottmann, whom Senator Claiborn Pell, the author of the federal legislation, credits for the idea of the corridor.[21] Other corridor-like megalopoli exist in the area between Cleveland and Pittsburgh, Dallas and Fort Worth, Chicago and Milwaukee, Portland, Oregon and Vancouver, British Columbia, and in many other places, each of which is characterized by increased accessibility along a major axis of transportation. At a larger scale, the area between the Midwest and the Atlantic seaboard, long identified by geographers as the core urban-industrial area of the United States,[22] has recently been called by a planner the "Great Lakes Megalopolis,"[23] in which the east coast Megalopolis is at one end, the Chicago-Milwaukee conurbation at the other, and the Cleveland-Pittsburgh megalopolis in the center. Thus, just as geographers have identified a hierarchy of "central places," ranging from the crossroads hamlet to the world metropolis,[24] so there is emerging a concept of a hierarchy of conurbations, corridors, or megalopoli, constituting the framework of the pattern of urban development and urban functional organization.

The Nature of Urban Functions

Lewis Mumford has identified cities as "containers," since they contain the agglomoration of people and facilities which perform certain functions identified as urban.[25] What are the urban functions, in the performance of which the structural and spatial forms of organization discussed above have evolved?

The urban functions are predominantly, as indicated above, those which depend upon accessibility, whether by mutual proximity or transportation, or, most commonly, a combination of the two. Thus, in a sense, all basic urban functions are "central place" functions. Most urban geographers and economists differentiate functions as economic and

non-economic, although even the essentially non-economic functions, such as education, religious shrines, and residence, have important economic aspects. The economic functions include, in one sense, the "central place" administrative and control functions, such as government, as well as the administration of business organizations. Many people differentiate economic functions into three or four categories. The primary functions are those which result in the exploitation or extraction of resources of the site, such as mining, forestry, and agriculture, whether or not the resources are renewable. Secondary functions are those involving the physical handling and processing of goods, including manufacturing, packaging, storage, and transportation. Tertiary functions involve transfer of title or ownership, and include retailing and wholesaling. Some writers include record-keeping among the tertiary functions; others designate them in a separate category as quaternary functions.[26]

The primary functions are not predominantly urban in character, although some give rise directly to urban settlements, such as fishing communities, mining camps, and others, but, invariably, other urban functions arise wherever numbers of people gather in mutual proximity. The locational patterns of the secondary functions depend upon relative access to raw materials, components, energy resources, manpower, markets, and site availability in varying proportions, and there is extensive literature on the factors of industrial location.[27] The tertiary and quarternary functions tend to locate at points of maximum accessibility to their respective service areas or "hinterlands," which are, in turn, "nested" in a hierarchical arrangement, giving rise to a hierarchy of central places or urban nodes within which the functions are concentrated.[28] A variation of the urban hierarchy in some areas is the "primate city" arragement, in which one city dominates an extensive area, and several of the lower orders of urban places, between the dominant city on the one hand and the smaller places on the other, are absent. At the top of the hierarchy is the "world city," whose service area for some functions may be intercontinental.[29]

Cities are also centers for the origination and diffusion of both material and non-material culture.[30] By providing concentrations of people, interaction and the development of new ideas and concepts is facilitated in cities; the larger the city the more likely is it to be the seat of new ideas and inventions, and the more attractive it becomes for the leaders in all fields. Thus, the gravitative pull of the city depends upon its mass, or population size and diversity, and the larger the city the more likely is it to attract additional population. This, in turn, creates more interaction and reinforces the role of the city as a center from which innovations diffuse outward. The increased diversity of the city, in turn, makes it more attractive, for maximum freedom of choice is available in the larger urban agglomorations. In larger metropolitan and megalopolitan agglomorations the greatest variety of economic, social, and cultural opportunities exist, as well as the greatest choice of housing accommodation and residential environments. Thus, there is a rural-urban migration, and a differential rate of growth, other factors being equal, favoring the larger urban concentrations over the smaller ones. The increased availability of the automobile, which releases urbanization from dependence upon a limited number of areas especially favored by mass transportation, is spreading the accessibility to the big-city advantages, homogenizing the culture, reducing the formerly sharp differences between urban

and non-urban areas, and constituting new and abundant opportunities for geographers to investigate the changing relationships, in urban settings and beyond, between man and his culture on the one hand and the emerging spatial patterns and environmental challenges and opportunities on the other.

FOOTNOTES

[1] A general review of the main directions and trends in urban geography is contained in Philip M. Hauser and Leo F. Schnore, eds., *The Study of Urbanization* (New York: John Wiley & Sons, Inc., 1965), especially pp. 81-114, which includes an extensive bibliography. Recent applications to planning are presented in Leo F. Schnore and Henry Fagin, eds., *Urban Research and Policy Planning* (Beverly Hills, Calif.: Sage Publications, Inc., 1967), especially Chapter 8, "Urban Geography and City and Metropolitan Planning" by Harold M. Mayer, pp. 221-238.

[2] A classic statement of this principle in the geographic literature is that of Charles C. Colby, "Centrifugal and Centripetal Forces in Urban Geography," *Annals* of the Association of American Geographers, XXIII, 1 (March 1933), 1-20. In the literature of urban planning, an excellent statement of the process is: Hans Blumentfeld, "The Tidal Wave of Metropolitan Expansion," *Journal of the American Institute of Planners*, XX, 1 (Winter 1954), 3-14.

[3] There is extensive literature describing and documenting the negative exponential pattern of urban density. For example: Colin Clark, "Urban Population Densities," *Journal of the Royal Statistical Society*, Ser. A, CXIV (1951) 490-496; Richard F. Muth, "The Spatial Structure of the Housing Market," *Papers and Proceedings of the Regional Science Association*, VII (1961), 207-220; C. A. Doxiadis *et al.*, "Densities of Human Settlements," *Ekistics*, XXII, 128 (July 1966), 77-101; A critical review of some of the literature is Bruce E. Newling, "Urban Population Densities and Intra-urban Growth," *Geographical Review*, LIV, 3 (July 1964), 440-442.

[4] Marion Clawson, R. Burnell Held, and Charles H. Stoddard, *Land for the Future* (Baltimore: The Johns Hopkins Press, 1960), especially pp. 109-114.

[5] Jean Gottmann and Robert A. Harper, eds., *Metropolis on the Move; Geographers Look at Urban Sprawl* (New York: John Wiley & Sons, Inc., 1967).

[6] *The Municipal Yearbook, 1967* (Chicago: The International City Managers' Association, 1967), pp. 11-17.

[7] The problems of selecting suitable areal units are discussed in Otis Dudley Duncan, Ray P. Cuzzort, and Beverly Duncan, *Statistical Geography* (Glencoe: The Free Press, 1961), and by David Grigg, "Regions, Models and Classes," *Models in Geography* by Richard J. Chorley and Peter Haggett (London: Methuen & Co., Ltd., 1967), pp. 461-509. The latter contains an extensive bibliography on the problem of geographically significant statistical units.

[8] Richard F. Babcock, *The Zoning Game* (Madison: The University of Wisconsin Press, 1966); Sidney M. Wilhelm, *Urban Zoning and Land-Use Theory* (New York: The Free Press of Glencoe, 1962).

[9] One of the most widely known presentations of the disparities between city and suburban schools is James B. Conant, *Slums and Suburbs* (New York: McGraw-Hill Book Co., 1961).

[10] The principle of complementarity is effectively presented by Edward L. Ullman, "The Role of Transportation and the Bases for Interaction," *Man's Role in Changing the Face of the Earth*, edited by William L. Thomas, Jr. (Chicago: The University of Chicago Press, 1956), pp. 862-880. Complementarity is also related to the gravity analog in spatial interaction, the subject of many articles in the literature of both geography and planning. For example: Gunnar Olsson, *Distance and Human Interaction: A Review and Bibliography* (Philadelphia: Regional Science Research Institute, 1965).

[11] The literature on relations between transportation and land use is enormous. A few examples: Lowdon Wingo, Jr., *Transportation and Urban Land* (Washington: Resources for the Future, Inc., 1961); Walter G. Hansen, "How Accessibility Shapes Land Use," *Journal of the American Institute of Planners*, XXV, 2 (May 1959), 73-76; numerous reports of the Highway Research Board (Washington), and the proliferating reports of the many comprehensive metropolitan transportation-land use studies, such as the *Final Report, Chicago Area Transportation Study* (3 vols., Chicago: Chicago Area Transportation Study, 1959-61).

[12] Functional specialization among cities is the subject of a vast literature on "economic base." Among the more useful items are Ralph W. Pfouts, *The Techniques of Economic Base Analysis* (West Trenton, N.J.: Chandler-Davis Publishing Co., 1960), selected readings; Charles M. Tiebout, *The Community Economic Base*

Study (New York: Committee for Economic Development, 1962); John W. Alexander, "The Basic-Nonbasic Concept of Urban Economic Functions," *Economic Geography*, XXX, 3 (July 1954), 246-261; Walter Isard, "Interregional and Regional Input-Output Techniques," Chapter 8 of his *Methods of Regional Analysis* (Cambridge: Technology Press and New York: John Wiley & Sons, Inc., 1960), pp. 309-374; Edward L. Ullman and Michael Dacey, "The Minimum Requirements Approach to the Urban Economic Base," *Proceedings of the IGU Symposium in Urban Geography Lund 1960* (Lund Studies in Geography Ser. B. Human Geography, No. 24, Lund, 1962), pp. 121-143. The differences among cities with respect to their economic functions also may serve as a basis for functional classification of cities, a subject of a proliferating literature, examples of which are Chauncy D. Harris, "A Functional Classification of Cities in the United States," *Geographical Review*, XXXIII, 1 (January 1943), 86-99; Howard J. Nelson, "A Service Classification of American Cities," *Economic Geography*, XXXI, 3 (July 1955), 189-210; Richard L. Forstall, "Economic Classification of Places over 10,000, 1960-1963," *The Municipal Yearbook 1967* (Chicago: The International City Managers' Association, 1967), pp. 30-65. Also R. H. T. Smith, "Method and Purpose in Functional Town Classification," *Annals* of the Association of American Geographers, LV, 3 (September 1965), 539-548.

[13] National Capital Regional Planning Council, "The Regional Development Guide 1966-2000, Washington, D.C.," (Washington: Government Printing Office, 1966); *Comprehensive Plan of Chicago* (Chicago: Department of Development and Planning, 1966); *The Comprehensive General Plan for the Development of the Northeastern Illinois* (Chicago: Northeastern Illinois Planning Commission, 1968).

[14] An interesting study of one such multi-nodal urban agglomoration is F. Stuart Chapin, Jr., and Shirley F. Weiss, eds., *Urban Growth Dynamics in a Regional Cluster of Cities* (New York: John Wiley & Sons, Inc., 1962).

[15] Jean Gottmann, "Megalopolis, or the Urbanization of the Northeastern Seaboard," *Economic Geography*, XXXIII, 3 (July 1957), 189-200.

[16] Patrick Geddes, *Cities in Evolution* (London, 1915; reprinted, London and New York: Oxford University Press, 1949).

[17] Lewis Mumford, *The Culture of Cities* (New York: Harcourt Brace and Company, 1938), and *The City in History* (New York: Harcourt, Brace & World, Inc., 1961).

[18] Jean Gottmann, *Megalopolis* (New York: The Twentieth Century Fund, 1961).

[19] *The Region's Growth: A Report of the Second Regional Plan* (New York: Regional Plan Association, 1967).

[20] *Highway Travel in Megalopolis* (New York: Wilbur Smith and Associates, 1963).

[21] Robert A. Nelson, "A Quick Rundown on the Northeast Corridor Transportation Project," *A Report on the 1966 Conference on Mass Transportation*, University of Chicago Center for Continuing Education, March 4, 1966 (Cleveland: Brotherhood of Railroad Trainmen, 1967), pp. 117-122.

[22] This "core region," the American Manufacturing Belt, is identified in virtually all of the standard geographic texts on North America. For example: C. Langdon White, Edwin J. Foscue, and Tom L. McKnight, *Regional Geography of Anglo-America* (3rd ed.; Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1964), pp. 32-66.

[23] C. A. Doxiadis, "The Great Lakes Megalopolis," *Ekistics*, XXII, 128 (July 1966), 14-31.

[24] The concept of the central-place hierarchy is one of the most intensively explored in the recent American literature of urban geography, and has attracted much world-wide attention. A comprehensive bibliography on the subject is Brian J. L. Berry and Allen Pred, *Central Place Studies; A Bibliography of Theory and Applications* (2nd ed., Philadelphia: Regional Science Research Institute, 1965). This bibliography contains annotations on over 1,000 items.

[25] Mumford, *op. cit.*

[26] William Goodwin, "The Management Center in the United States," *Geographical Review*, LX, 1 (January 1965), 1-16; William Applebaum, "Formation and Location of National Trade Associations in the United States," *The Professional Geographer*, XX, 1 (January 1968), 1-4; Sidney M. Robbins and Nestor F. Terleckyj, *Money Metropolis* (Cambridge: Harvard University Press, 1960).

[27] Benjamin H. Stevens and Carolyn A. Brackett, *Industrial Location; A Review and Annotated Bibliography of Theoretical, Empirical and Case Studies* (Philadelphia: Regional Science Research Institute, 1967).

[28] A very useful recent statement is Brian J. L. Berry, *Geography of Market Centers and Retail Distribution* (Englewood Cliffs, N.J., Prentice-Hall, Inc., 1967).

[29] Peter Hall, *The World Cities* (New York: McGraw-Hill Book Co., 1966).

Making a Living in Cities: The Urban Economic Base

Harold M. Mayer

People live in or near cities in order to secure advantages which would not be possible under non-urban conditions. Among these advantages are the satisfaction of many desires: social, religious, recreational, and economic, but most of them depend upon the individuals making a living. The economic base, therefore, constitutes the reason for the development and growth of most cities. Even essentially non-economic functions, such as defense, recreation, and pilgrimages to historic and religious shrines, constitute important income-producing activities for the cities and regions within which they occur. Knowledge of the economic base of cities, therefore, is an indispensable prerequisite to an understanding of urban geography.

CHARACTERISTICS OF URBAN FUNCTIONS

Jean Bruhnes, two generations ago, called urban land uses such as houses and streets "unproductive occupation of the soil."[1] He was referring, of course, to the classical concept of the economist that the significant inputs into an eco-

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nomic system are land, labor, and capital, and that the natural resources of the site, including its agricultural, mineral, or silvicultural productivity, are the only productive forms of land use. More recently, Chauncy Harris pointed out that cities are efficient instruments for utilizing resources productively, including labor, which must concentrate in and near cities in order to perform its increasingly specialized roles, and that, in proportion to the amount of land used, urban land is thus extremely productive, in the sense that it creates utility by the processing, transfer, and distribution of goods and services.[2]

Economists and geographers find it useful to divide income-producing activities into several categories, which they designate as primary, secondary, and tertiary.[3] Primary activities are those which produce utility, and hence income, by extraction of the resources on the site, whether the resources are renewable, such as agricultural produce or waterpower, or are non-renewable, such as minerals and petroleum. Secondary activities are those in which goods are handled; included in that category of economic activities are manufacturing and transportation: any activity which involves the changing of the form or location of commodities. Tertiary activities involve either the performance of services or change in ownership of goods, as in wholesale and retail trade. With increasing complexity of society and its economic activities, there is an ever-increasing amount of record-keeping and "paper work"; some authors prefer to categorize these activities as quaternary, rather than tertiary.[4]

Few cities have as their most important functions the primary activities. Even though many urban places are directly dependent upon such activities, they actually function as manufacturing or service centers, utilizing the resources produced nearby or performing services for the organizations and people who, in turn, are directly involved in the primary activities. If the resource is non-replaceable, the urban center which serves the extractive operations may have a precarious economic base, and may decline or disappear when the resource is exhausted or becomes non-competitive in the market with other sources or substitute resources. Such places may become "ghost towns" unless other activities can be introduced to replace the declining ones.

Urban land is valuable, then, not for its inherent productivity of natural resources, but, rather, because of its location with relation to the secondary, tertiary, and quaternary activities: the handling of goods and the performance of services.[5] Since land is valuable only for its present and prospective uses, and all urban functions, most of which are economic in character, take place on land, it follows that studies of the economic base must constitute essential parts of the field of urban geography as well as major components of the research which is an integral part of the process of city and regional planning. Because urban functions are highly localized and concentrated, the spatial aspects of the urban economy are the foci of the geographer's interest in economic base studies.

Communities which depend mainly on primary economic activities—the extraction of resources—directly or indirectly for their support, are, of course, resource-oriented with respect to their locations: they are located close to the resources. Those urban places which depend mainly upon secondary activities—manufacturing, assembling, and packaging of goods—may be resource-oriented in location, or market-oriented, depending upon many variables, such as the relations of weight, bulk, and value of the

goods, and hence their ability to stand transportation costs as raw materials, semi-finished goods or components, or manufactured products, or they may be "footloose" and free to locate anywhere between the source of their resource inputs and the final markets.[6] As transportation costs are reduced relative to other costs, there is a noteworthy tendency for an increasing proportion of the manufacturing industries to become footloose or market-oriented.[7] This tends to accentuate the population and economic growth of the larger urban agglomerations, and to augment their attractiveness for still more activities and population; there is thus a "multiplier effect."

Wholesale trade may be regarded as a form of secondary economic activity in the sense that goods are handled and stored; orders are assembled for distribution, and warehouse buildings represent forms of industrial structures. Wholesale facilities, therefore, are subject to the same effects as are manufacturing establishments. They may be located in proximity to the manufacturing establishments, but more commonly they are located close to the major markets—the larger urban centers. On the other hand, competition for centrally-located urban land by other uses generally forces wholesale establishments having warehousing requirements to the peripheries of the larger cities, while the wholesale office establishments and display rooms may remain in more central locations. In general, improvements in transportation and changes in the methods of marketing, including the rise of chain stores, standard brands, and emphasis upon reduced inventories requiring storage, has reduced the relative importance of warehousing as an element in the urban pattern. The current trend is to consider wholesaling and warehousing as an "interface" or intermediate stage in a transportation route which, in turn, is part of a total distribution system.[8] With a trend toward separation of warehouses from offices and sales rooms of wholesalers, the latter may more properly be regarded as tertiary, rather than secondary, functions. On the whole, there have been far fewer studies of the locational patterns, both theoretical and empirical, than of location of either manufacturing or of retailing establishments.

The final stage in the chain of movement of resources, whether or not they undergo change enroute, is the distribution of goods and services to the ultimate consumer. Tertiary activities thus tend to be less concentrated in location than do the primary and secondary activities. Some, such as food retailing, tend to locate in patterns closely resembling those of the consuming population, for everyone eats. Goods and services which are more specialized tend to be less ubiquitous, and to concentrate in larger urban centers, for they require a larger population base, or disposable income, for their support. Thus there tends to be a hierarchy of retail and service establishments, with the more specialized ones in fewer but larger urban centers, and there also tends to be a hierarchy of the urban centers which supply consumer goods and services, the larger centers, requiring a larger "threshold" of support, having larger and more specialized establishments. The "trade areas" or "hinterlands" of the larger and more specialized establishments, and consequently of the larger urban centers containing them, tend to be larger than those of the less specialized urban places. At the same time, the larger centers also have "lower order" functions within them, duplicating the functions of the smaller centers, and serving smaller trade areas than those of the more specialized functions within the same center.

The location and characteristics of the tertiary functions of urban places, and their respective service areas have been

intensively studied over several decades by geographers and others, and a theoretical framework has been developed, generally known as "central place theory," following the terminology of Walter Christaller, who formalized the theoretical statement in 1933.[9] There is probably a larger volume of theoretical and empirical studies of central places than of any other topic within the entire field of urban geography.[10]

In satisfying the economic demands of people everywhere, except in the few remaining isolated regions which are self-sufficient, goods and services are made available at the locations of the consumers, who constitute the market, regardless of where the resources are originally located. In terms used by economists, resources must be given "place utility": they must be transported. Goods must be delivered and services must be performed either at the residential location of the consumer or at an establishment so located as to involve a minimum of travel by the consumer. In any event, the complex of establishments providing goods and services (including consumption) involves clusters of inter-related complementary or competitive establishments, or central places. These places, in turn, must be accessible, and thus they are served by networks of transportation and communication routes. They are nodes or vertices, in an inter-connected network of lines or routes over which people and goods move in order to satisfy demands for goods and services.[11] Central place theory relates tertiary functions and establishments to the transportation network. Location theory, which describes and interprets the patterns of location of secondary functions and establishments, likewise depends upon the existence of a transportation network for assembly of inputs—raw materials, fuels, components, and labor—and the distribution of outputs from the establishment to successive establishments for later stages in the transformation of resources from their original state and location into forms and locations to meet the consumer demands. Thus, the location of economic activities, and hence of urban places within which these activities are performed, depends upon transportation, and transportation geography and urban geography are practically inseparable.[12]

Accessibility is fundamental to the performance of any economic function. Since all inter-acting establishments and functions cannot be located in mutual proximity, transportation must be used to overcome distance. In movement of resources between origin and place of utilization, and in providing goods and services at and from central places, movement along transportation routes must take place. Movement represents a cost, and the cost may be substituted for lineal mileage in the measurement of distance in determining the effectiveness and strength of the bonds which inter-relate places with one another. The boundaries of the areas within which resources may effectively compete with alternative sources, and the boundaries of trade and service areas around central places can be ascertained, in general, by application of the concept of "distance decay," which simply means that the farther apart two places are, the less traffic is likely to be generated between them, and there is a point in every direction from a place, where some other place is equally attractive; such a place is a "traffic-divide" or a hinterland boundary. The "distance decay" tends to be a negative exponential curve; the strength of the attraction to a particular place falls off at a decreasing rate with distance. Also, the larger and more diversified a place is, the stronger the attraction it exerts. This is analogous to the physical law of gravitation, and the gravity analog or model has been very useful in predicting the traffic generation to be exerted by cities,

shopping centers, and other nodes as well as to anticipate the volume of traffic to be moved on new links in the transportation networks. Similarly, the total gravitative attraction exerted by a central place or establishment represents the total attraction of that place relative to all other places with which it has interaction.[13] The latter represents what is called "potential." If all of the places in the United States have their relative potentials represented by an imaginary surface, such as can be shown by contours, it can readily be seen that the places and areas with highest density of population and purchasing power—namely, the cities and urbanized regions—represent peaks and ridges of maximum potential. These areas are especially attractive for new market-oriented establishments and activities.[14] In other words, the larger and more accessible urban places and regions tend to attract economic activity, and hence population, to a greater extent than do smaller places and less densely populated regions. The additional concentration of people, establishments, and activities, in turn, further reinforces the market, and gives rise to still further growth, specialization, and diversity, and thereby creates still additional attractive force. With larger markets, more goods and services can be, and are, provided, and the unit costs of production, spread over more units, can be reduced, making the large urban concentrations still more attractive; this is what economists call "agglomeration economies" or "scale economies." Furthermore, the larger cities and metropolitan areas can support increased specialization; a wider variety of goods and services is available from an increasing number of specialized establishments, thereby reducing or eliminating the necessity for many auxiliary activities from being related to specific plants; the specialized establishment can be called upon to supply items or services which otherwise each plant would have to supply for itself. This increases overall efficiency and makes establishments in larger and more diversified urban areas better able to compete, with lower costs, in more distant markets, thereby overcoming to a major extent the transportation cost disadvantages in reaching distant markets. This phenomenon is called "external economies," and it is a major force in attracting many activities to the larger cities.[15] Its effects constitute an essential base for central place theory, and Mark Jefferson recognized it in his "Law of the Primate City," when he pointed out that the largest city in a region or nation tends to enhance its primacy by exerting the strongest attractions for the greatest variety of activities.[16] In one sense, the primate city may be regarded as a special case: it represents the top of the hierarchy of central places. In many countries and regions, the numbers of urban places of various population sizes seem to follow a rank-size relationship in which all places bear a definite size relationship to the largest place, in regular descending order of rank: thus the second-ranking place would tend to be half the size of the largest place, the third ranking place one-third the size, and so forth. Cities and metropolitan areas of the United States tend to have such a rank-size relationship.[17] Here, the primate city is, of course, the top-ranking one, and all others tend to be related in population size inversely to their rank; New York is the primate city, Chicago and Los Angeles metropolitan areas, respectively, are the next-ranking ones, but New York also contains regional functions for the eastern third of the United States, corresponding to the regional functions of Chicago for the Midwest and Los Angeles for the Far West. Below these regional primate cities, in each instance, there is a regular procession of metropolitan areas (SMSA's), having a rank-size relationship.

TRAFFIC FLOWS AND THE URBAN ECONOMIC BASE

We have seen that cities constitute foci or nodes in networks of transportation and communication, making possible the inter-actions with other cities and with the service areas or hinterlands. The urban functions depend upon accessibility, which conditions specialization of land uses,[18] and give rise to interchange, or movement of people, goods, and ideas between and among cities, and between cities and their respective hinterlands.[19] These flows, constituting what Edward Ullman calls "spatial interaction,"[20] produce traffic, the volume of which, along transportation and communication routes, is the measurable result of the gravitative "pulls" exerted by the various urban centers or subcenters: the "traffic generators."

Since cities are essentially areas of specialized land uses, facilities, and establishments, which depend upon spatial interactions with each other and with external areas, it follows that an effective method of analysis of the economic base of a city or metropolitan area would be to study the volumes and composition of the traffic flows—of people, goods, and information—between the city and each area or region outside. These flows, of course, are two directional, and they reflect the nature of the urban functions which give rise to them.

Unfortunately, however, there are several major difficulties. One set of difficulties is the general lack of usable data on traffic flows for areas which are geographically significant.[21] There are several reasons for lack of useful data: among them are the high cost of gathering information, commercial competition in the United States where common and contract carriers are mainly private enterprises, the high proportion of the traffic which is carrried in private vehicles, military security, and lack of agreement on area boundaries for statistical purposes.

Geographic studies of ports are numerous, nevertheless, and it was largely as a result of the concepts of hinterlands developed in port studies that the city-region relationships have been emphasized by urban geographers.[22] Port statistics are more readily available than are statistics for other transportation movements, and especially available are international movement statistics, for people and goods involved in transit through ports enroute to or from foreign countries are subject to regulation by immigration, customs, and public health authorities, all of whom maintain statistics, and many of whom publish aggregated figures on such movements in more or less usable form.

Ports, furthermore, are of special interest to geographers, because they are generally gateways to and between complementary regions, the interactions of which, in the form of traffic flows, may be indicative of the character of development of the respective regions. Extensive statistics are available, for many nations, on the volume, direction, and composition of flows of goods and people through their respective ports, although commonly the landward points of origin and destination are difficult or impossible to determine without elaborate supplementary studies.

Detailed point-to-point statistics are available for domestic and international movements of air passengers and cargo at airports of the United States and some other countries, though here, too, the actual landward origins and destinations, beyond the respective airports, may be difficult to determine. Nevertheless, the air traffic flows among urban areas are indicative of the character, extent, and volume of interaction among major cities, and several studies by geographers

have been useful in determining the air traffic hinterlands of cities.[23]

Railway traffic flows are generally unavailable, or are not available for geographically meaningful areas, and it is difficult, and usually impossible, to determine the volume and nature of freight movements into, out of, and through, urban areas.[24] Similarly, movements by motor truck are not generally available, although a few special studies have been made to determine the motor truck hinterlands of cities; these, however, do not include information by commodities.[25] In some parts of the world, inter-city bus services carry significant proportions of the passenger movement. In such instances the pattern of bus routes is indicative of the urban hinterlands, and may be used to indicate, also, the position of towns in the central-place hierarchy.[26] In the United States, however, only a small portion, less than 2.5 percent, of the inter-city personal movement is by bus, while private automobiles are responsible for over 90 percent of the passenger movement to, from, and between urban places. Knowledge of the volumes, directions, purposes, and other characteristics of automobile trips is indispensable, therefore, not only for the planning of street and highway systems, but also as an integral part of the process of city and metropolitan planning generally, in which the reciprocal relations between transportation systems on the one hand and the locations, functional characteristics, and densities of land uses on the other are studied in considerable detail, and projections are made of possible alternative arrangements of transportation routes and land uses in the future. Indeed, such studies, integrating the functional patterns of urban areas and the present and proposed locations of streets, highways, and other transportation facilities have been made mandatory by the federal government since 1965 as prerequisite for federal funding of many public improvements, including highways, mass transit, urban renewal, open space land acquisition, sewer and water supply systems, and many others. Such studies are required to extend beyond city boundaries and to include all metropolitan areas. They are generally conducted by designated metropolitan or regional planning agencies, which subsequently must indicate conformance with regional comprehensive plans if any local governmental unit is to receive financial aid from the federal government for each of a wide variety of public improvement programs. In these studies, urban and transportation geographers are playing increasingly important roles. Particularly significant is the fact that studies of origins and destinations of present and prospective trips are always major portions of such comprehensive planning operations, and economic base studies form the framework for population projections which, in turn, are highly useful in the preparation of comprehensive regional, metropolitan, and city plans.[27] The potentialities for utilization of the increasing number of such transportation-land use studies in determining the nature and extent of the economic base and hinterland connections of cities are very promising. As such studies are produced for more and more areas, intercity comparative analyses may yield significant generalizations and understandings relative to urban growth and development, leading to predictive models of great theoretical and practical importance. Furthermore, as subsequent studies are made, in future years, for the same areas as those subjected to earlier studies, detailed knowledge may be gained of changes and trends in the economic base, population distribution and characteristics, and travel patterns of such urban areas.

Such comprehensive metropolitan transportation studies confirm the fact that only a very small proportion of the

trips originating or terminating within a metropolitan area cross the boundary of the area, as would be expected from the nature of the definition of such areas. Flows crossing the boundary, however—"external" trips—are significant to understanding the nature of city-hinterland relations. Flows of goods are less readily available statistically, but the proportion of total goods movements which are external undoubtedly far exceeds the proportion of internal trips, for urban areas consume tremendous quantities of goods and fuels, and must ship out vast amounts of products and wastes. If more detailed information relative to these movements were available, we could much better understand the nature and extent of the urban economic base.

For purposes of economic base analysis, however, the most significant classification of flows of both people and goods is the dichotomy between external movements, originating or terminating beyond the area boundaries, on the one hand, and internal movements not crossing the area boundaries, on the other hand.

Cities and regions, engaged in production of specialized goods and services, provide economic support for their populations by exchanging such production, to the extent that they do not consume it themselves, for the specialized goods and services produced by other cities and regions. Thus there are "inputs" and "outputs," the total representing the external trade of the given city or region. However, there are two additional considerations. One is that not all of the production can be "exported," because the needs of the people and establishments within the given area must also be satisfied, and a portion of the goods and services which the area produces are for local consumption. A second consideration is that the value of the inputs and outputs of an area may not be equal in value; therefore if the value of inputs exceeds that of outputs, the balance must be restored by outflows of money and credit, and, conversely, if the area exports are of higher value than the imports or inputs, money and credit must flow into the area. This, of course, has been extensively studied for nations, for which the balance of payments may be critical. National balance of payments accounts are relatively easy to determine, for records are kept and are available for flows of goods, services, people, money, and credit across national boundaries. For local or sub-national areas, however, such as cities and metropolitan areas, few usable records are available, and geographers cannot directly study the economic base of such areas in the same way as the national and international balance of payments can be investigated.[28] Furthermore, although income and its distribution is important, geographers are also interested in the numbers and characteristics of the people supported by a city's income, the physical flows of goods and services, and the facilities for effectuating such flows; income flows alone tell only a part of the story.

Three approaches to the study of the economic base of cities have been extensively used by geographers. All are based upon the concepts of flows and the dichotomy of external and internal components of economic support. These approaches may be termed: (1) the basic-nonbasic approach, (2) the input-output approach, and (3) the minimum or average requirements approach. All of them are concerned with the flows into and out of cities and regions, and all of them develop the concept that the basic economic support of an area lies in the specialized functions which it performs for people and establishments outside of the area. The cliché that people do not live by taking in each other's washing is crude, but apt.

THE BASIC-NONBASIC APPROACH

The basic-nonbasic approach has particular appeal for geographic study because it provides a tool by which may be determined the extent of specialization within a city or region, as contrasted with larger regions of which it is a part, or of other cities and regions. Furthermore, it can furnish an indication, though crude, of the number of people, as well as their incomes, supported by each "export" activity, and it furnishes a measure of the extent to which the city or region is dependent upon other cities and regions. Such determinations are extremely useful in determining which activities are vital, and which serve the population within the city or region which is, in turn, dependent upon the "basic" or "export" activities. In planning and development programs, it follows that stimulation of and provision for the "export" or "basic" activities would result in more leverage for growth than would the further development of the remaining functions or activities which are dependent upon the basic ones.[29] Since the population engaged in supplying goods and services for consumption outside the given region, such as a metropolitan area, must, in turn, be supplied with goods and services, the employment and income involved in such secondary or supporting activities represents a "multiplier effect." The population—to which must be added family dependents—and the income involved in the "export" activities are considered "basic" and the people and incomes involved in supplying the needs of the basic population is termed "nonbasic" or "secondary." This population, in turn, must also be supplied, so there is a succession of rounds of employment and income created, resulting in further population increases.

There are several ways in which the extent to which a given urban function is basic may be measured, and in which determination may be made of the extent to which any combination of functions contributes to the economic base of a community or region.[30] Thus, if a given activity, say steel production, results in employment (or income, if the figures were available) within a metropolitan area to the extent that such employment represents twice the proportion of steel-production employment as steel-production employment percentage is of the employment in the same category of industry in a larger area, such as the nation as a whole, it is assumed that the difference, or surplus employment, represents that proportion of the workers engaged in producing steel for shipment outside the area. This is "basic" or "city forming"[31] employment, while the remaining employment in the steel plants of the metropolitan area is "nonbasic" or "city serving" employment, producing for local consumption. The ratio between basic and nonbasic employment—the "B/N" ratio—indicates the relative importance of each category of economic activity in producing employment and hence contributing to the economic support of the city or region.

There are many difficulties in applying this rather simple concept. One set of problems involves the difficulties of obtaining data. It is not always possible to ascertain the extent to which a given category of activity actually serves patrons or customers outside the region, particularly where, in large and complex areas such as metropolitan areas, there is a sufficiently large number of establishments so that individual questionnaires become prohibitively expensive and time-consuming; furthermore, because of commercial competition, a significant proportion of the business establishments would withhold such data.[32] In most such studies, aggregated statistics, such as census reports, are used.[33]

Another problem is the selection of the appropriate measures. This is determined largely by the use to be made of the results, i.e.: whether it is desired to obtain the B/N ratio with respect to employment, income, present and prospective land use by categories of activity, or other types of findings. If employment figures are to be used, allowances must be made for part-time, seasonal, and other irregular employment, for the elasticity of demand for marginal workers, such as married women and young people who may or may not be on the labor market depending upon the level of economic activity and wages at a given time, commuting labor force from outside the defined area, absentee population such as members of the armed forces, remittances from people and establishments outside which may create a market and hence employment within the area, and many other variables.

The delimitation of the area boundaries may constitute another set of problems. Administrative boundaries—cities, counties, and states—rarely represent functionally meaningful boundaries, except for special purposes, such as public administration and fiscal purposes. City limits do not bound the geographically functional cities. People commute across such boundaries, and retail and service establishments on both sides of the line compete for their expenditures. If, however, a planner is concerned with the financial base, the allocation of land among potential uses, or administrative policy for such a jurisdictional unit, the boundary is determined. Metropolitan areas (SMSA's) are generally more appropriate functional units, but they, too, by no means have closed economies, so that people and money, as well as goods and services, are free to cross metropolitan area boundaries. Other things being equal, the larger and more complex an area, the more apt it is to furnish a high proportion of its needs for goods and services; thus it would have a higher proportion of nonbasic activities and employment.[34] However, urban areas generally do not produce significant quantities of the foodstuffs and fuels that they require, and they do not have adequate facilities for disposal of wastes within their boundaries, so that an "import-export" or "basic" component is always present. Thus, the location of an area's or region's boundaries has an important bearing upon the B/N ratio, both in total and for individual components of the economy. The economic base of a metropolitan area is not the same as the economic base of its central city.

The basic-nonbasic approach has many limitations, and has been frequently criticized. One type of criticism is that the approach places too much emphasis upon the basic components. With increasing specialization, the growth of leisure, and growing affluence, the variety of demands for goods and services is increasing, and service functions are increasing more rapidly than is the supplying of goods. Most of the services are supplied internally, especially within the larger cities and metropolitan areas. Thus the internal or nonbasic portion of the economy is increasingly important. Hans Blumenfeld points out that much of the attractiveness of the large metropolis is not in the industrial jobs which it provides, in which the basic component is high, but rather in the attractions, including services, which the urban area itself can furnish. Such services are "nonbasic" in the sense in which the term is here used.[35]

Economists and planners tend to emphasize the crude nature of the basic-nonbasic approach.[36] This, of course, is inherent in the paucity of the data which would be essential for more sophisticated methods. Other criticisms are based upon the limitations of the basic-nonbasic approach in not being able to

allow for major changes in technology or general social, economic, and political conditions in the future. However, these criticisms are equally applicable to more sophisticated and refined methods of study which involve projection from past trends and present conditions.[37] How, for example, could one have accurately predicted the economic base of the central-east coast of Florida—including Cape Kennedy—as recently as a decade ago, or of any region subjected to the introduction of "random variables," such as the location of major new technological developments?

THE "INPUT-OUTPUT" APPROACH

A second approach to study of the urban economic base which has been developed, largely by economists and "regional scientists," is known as the "input-output" approach. Inputs are those items: physical goods, including raw materials and components as well as fuels, labor, capital investment, and credit, which make possible an economic activity within a region or an individual establishment. The sum of the inputs to all establishments, including households, the ultimate consuming unit, is the total set of inputs into a region. Similarly, outputs are the products of the region or of individual establishments. In the case of a region, such as a city or metropolitan area, inputs and outputs may, in many instances, be entirely among the establishments within the area, but some inputs and outputs will involve interactions with external areas—other cities and regions. In this respect, the "input-output" approach resembles the "basic-nonbasic" approach. It evolved from the work of Wassily Leontief, an economist, who developed the method in studies of national economies.[38] As has been pointed out, statistics on inputs and outputs for nations are far easier to obtain than for regions smaller than nations. Therefore, the method has not been widely used in studies of the economic base of cities and metropolitan areas. However, a few such studies have been produced, notably by Walter Isard and his colleagues, who applied the method to determine the economic base of Puerto Rico—an island, which is an unusually readily identifiable economic unit—and to an evaluation of the probable multiplier effects resulting from the establishment of a new steel plant in the eastern United States.[39]

Application of the input-output approach involves the gathering, assembling, and processing of great masses of statistics, and elaborately detailed matrices showing the input-output interrelations of each of many categories of economic activity both within and outside the region. The availability of modern electronic computers has made possible the processing of these masses of statistics, but the problems of availability and collection remain to inhibit the widespread use of the method.

Briefly, the method consists of studying the effect of a given volume of inputs of capital, labor, components, and other elements of production into each of the many categories of activity which are present in a region upon the inputs and outputs of every other category, both inside and outside the region. Each category is represented in a matrix, or table, by a row and a column, and each cell—the intersection of a row and a column—represents the effects of the inputs and outputs in one category of activity upon the inputs and outputs of another one. Thus, if there are five hundred kinds of economic activities, the number of cells will be the square of five hundred, or 250,000. Actually, the numbers of activities of different types, classified in sufficient detail to be meaningful, may be several times as great. In operating an input-output matrix, information is obtained on the input requirements propor-

tional to the outputs, for each item such as labor, materials, etc., in each kind of establishment required from each other kind of establishment. Thus, a ton of finished steel, with present technology, requires a certain amount of input of iron ore, scrap, limestone, coke, water, labor, and so forth. The iron ore, in turn, must be mined, concentrated, transported, and stockpiled; so must the limestone, while the coke production requires coal which, in turn, must undergo these processes. At each stage in production, transportation, and distribution of goods, and in the performance of services, there are input requirements, which, in theory, can be quantified, and there are outputs produced, which can also be quantified. A change in input or output at any point in the change with respect to any item will be reflected in changes in inputs and outputs at many points in the chain of production. The steel workers must be fed, clothed, housed, entertained, educated, governed, and so forth, and each of these processes sets in motion other sequences of inputs and outputs, through many successive rounds, until, finally, the effects are "damped out," or subsumed in the total economy many stages removed from the original impetus. Thus, a change in labor input requirements in producing steel at Pittsburgh or Gary, because of changed market demands or improvements in technology within the steel plants will change the number of workers in the plant. This, in turn, will produce changes in the total requirements in those communities for goods and services of great variety, and each kind of changed demand will set in motion chains of input-output effects. These effects will by no means be confined to the local community. A change in demand for steel, for example, in Pittsburgh or Gary will change the amount of iron ore required from the mines in Minnesota or Quebec. This will, in turn, change the effective demand for goods and services supplying the miners in those distant areas. Furthermore, if the changes persist over a long period, it will affect the demand for transportation of ores, coal, stone, and other items constituting inputs to the steel plants, and this will, in turn, affect the number of workers required in the transportation industries and the demand for inputs into the multitudinous kinds of businesses and establishments serving them. If such changes persist, later there will be changes in the requirements for new railroad hopper cars and ore boats, and this will change the input-output relations in railroad car manufacturing plants, shipyards, and other establishments, including the demand for steel inputs into such plants, so that some of the relationships run full cycle. The magnitude of the work required for a detailed and meaningful input-output analysis then becomes obvious, and the practicality of such a method is thereby seriously limited.

Insofar as the inputs and outputs are confined to within the area of concern, such as a city or SMSA, even though they may involve a vast and complex series of interchanges among the commercial, industrial, residential, and other establishments within the area, they are internal with respect to the area, and thus "nonbasic" or "city serving," but insofar as they involve transfers of people, goods, money, or credit across the regional boundary, they are "basic" or "city forming." Thus the "input-output" approach may, in one sense, be regarded as an elaboration and refinement of the "basic-nonbasic" approach.

MINIMUM OR AVERAGE REQUIREMENTS APPROACH

Another method of economic base analysis which is finding increasing popularity is the minimum or average re-

quirements method. This is essentially comparing the city or region of concern with other cities or regions which resemble it with respect to significant attributes, such as size, age, and location. Thus, if it is desired to determine, on the average, how much land will be required for certain uses, such as industrial plants of various types, or how much employment can be anticipated, or income generated, by various types of activity, it may be useful to determine the average amounts actually utilized by comparable cities or regions.[40] Similarly, cities and regions may be compared, in various categories, with respect to the minimum requirements for each of the items, by finding the city or region in analogous sets of cities and regions which has the least amount of the item, whether employment, land, income, or other. All of the standard statistical measures of concentration and dispersion, such as deciles, quartiles, standard deviations and others, may be applied further to refine the analysis.

Population size appears to be the most significant variable relative to the minimum requirements of cities and metropolitan areas; there appears to be a more-or-less regular progression, some requirements decreasing with size, partly, at least, the result of scale economies, while others, such as service employment, tend to increase with size. Population size, therefore, is generally used as the determinant for classifying cities into groups within which the cities are sufficiently alike with respect to their requirements for comparative purposes.

The minimum and average requirements approach has been used to study a number of cities, ranging from Utica, New York, a depressed area on the verge of rapid change in the composition of its industrial base,[41] to Canberra, Australia, a national capital seeking greater diversity with respect to its economic "mix" and attempting to determine, in the preparation of a comprehensive plan, how much employment to expect and how much land to reserve, for industries and other functions, by comparison with other Australian cities of similar size.[42]

In spite of its utility, the average and minimum requirements method has certain serious drawbacks. How can we be sure that the cities or regions selected for comparison are truly analogous? Is it not possible that there may be independent variables which were not taken into consideration, such as, for example, the introduction of technological change since the last statistics became available, or the prospects of major changes in technology and economic or social conditions affecting requirements in the future?

CLASSIFICATION OF CITIES BY ECONOMIC FUNCTION

In order to reduce the possibilities of error in comparing cities or regions with one another, it is desirable to take into consideration as large a number as possible of independent variables, for any one or combination of them may be significant in affecting the validity of the comparison. Fortunately, the means are now at hand for processing vast quantities of data, and for determining which variables are related to each other. We can classify cities and regions by their economic functions, or by any other sets of variables for which statistics may be obtained. Modern computers have made possible the application of methods that would not have been feasible only a few years ago.

Functional classifications of cities by the distribution of employment in various categories of economic activity have been made by a number of geographers.[43] Such classifications, as

well as later ones using employment distribution by kind of establishment, occupation, or activity,[44] are univariate classifications, in that they use only one variable: employment.

A new technique for comparison of cities and regions with respect to many, rather than one, attributes is available, in the form of what is known as factor analysis or principal components analysis.[45] A large number of variables, obtained from many sources, can be grouped, by a standard computer program, into a small number of groups of related variables, and then comparing the groups in accordance with the extent to which they are inter-related. It is also possible to measure cities or metropolitan areas with respect to the nature and extent of their similarities and differences. The groups of related cities then constitute classes with respect to all of the sets of variables used. Thus, many measures of economic functions can be combined, and groups or classes of cities determined with respect to each of the sets of variables, or, on the other hand, a number of different measures of economic functions alone may be used to classify cities. British towns have been classified in this manner with respect to 57 different social and economic characteristics,[46] and American cities have similarly been classified by social and demographic characteristics.[47] Functional classifications, using the techniques of factor or principal components analysis, have been published for cities in several countries, including Canada, Australia, and India, among others.[48] Generally it has been found that the characteristics tend to group in from four to six related clusters, and these can be used to determine the extent to which cities in the country or region resemble each other with respect to any or all of these characteristics. Thus it is possible to group the cities in any number of groups from one up to the total number of cities involved, and to present cities classified into any intermediate number of groups based upon communalities, or resemblances. Thus, it is reasonable to transfer the experience in solving problems in one city, if successful, to other cities which closely resemble it, rather than to cities in which the similarities are less. Factor analysis thus becomes a tool of great potential.

CONCLUSION

In spite of the difficulties of analyzing the economic base of cities and metropolitan areas, such analyses are of great importance. Planners, and all who are interested in the solution of urban problems, realize that cities exist primarily in order to enable people to make a living, and that the employment opportunities, the income and other satisfactions resulting from employment, are the fundamental forces behind urban growth or decline. It is not possible to determine how many, or what types of houses and other facilities need to be provided, until one has some idea of the present and prospective opportunities for employment. These depend, in turn, upon the nature of the economic activities upon which the city or region is based. Availability of resources, of course, is fundamental, and the geographer can furnish insights different from, but no less important than, those of the economist in assessing the prospects for economic growth and development. Economic base studies clearly lead to the conclusion that no form of human occupance can replace cities, and that, in spite of the trend toward lower densities concommitant with improvements in transportation and communication, modern civilization cannot exist without cities. An understanding of the functions which they perform, a major proportion of which are economic functions, is therefore indispensable.

FOOTNOTES

[1] Jean Brunhes, *Human Geography* (Chicago: Rand McNally & Co., 1920), pp. 74-229.

[2] Chauncy D. Harris, "The Pressure of Residential-Industrial Land Use," *Man's Role in Changing the Face of the Earth*, ed. by William L. Thomas, Jr. (Chicago: The University of Chicago Press, 1956), pp. 881-895.

[3] Most standard textbooks in economic geography have adopted this terminology, for example: John W. Alexander, *Economic Geography* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1963), pp. 5-6.

[4] For an interesting account of the significance of these functions in metropolitan New York, see: Sidney M. Robbins and Nestor E. Terleckyi, *Money Metropolis* (Cambridge: Harvard University Press, 1960). Administrative functions may also be regarded as quaternary, as, for example, in Jean Gottmann, *Megalopolis* (New York: The Twentieth Century Fund, 1961), pp. 565-630. A discussion of business management as an urban function is: William Goodwin, "The Management Center in the United States," *Geographical Review*, LX, 1 (January 1965), 1-16.

[5] Location as related to urban land values is emphasized in all treatises on urban land economics and real estate. See, for example: Richard U. Ratcliff, *Urban Land Economics* (New York: McGraw-Hill Book Co., Inc., 1949); Ernest M. Fisher and Robert M. Fisher, *Urban Real Estate* (New York: Henry Holt & Co., 1954), and Arthur M. Weimer and Homer Hoyt, *Principles of Real Estate* (3rd ed. New York: The Ronald Press Company, 1954).

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[19] Harold M. Mayer, "Urban Nodality and the Economic Base," *Journal of the American Institute of Planners*, XX, 3 (Summer 1954), 117-121.

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[23] For example: Edward J. Taaffe, *The Air Passenger Hinterland of Chicago*, Research Paper No. 24 (Chicago: University of Chicago, Department of Geography, 1952).

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[9] Gunnar Alexandersson, *The Industrial Structure of American Cities* (Lincoln: University of Nebraska Press, 1956), pp. 14-20, reprinted in Mayer & Kohn, *op. cit.*, pp. 110-115.

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[13] Leslie J. King, "Cross-Sectional Analysis of Canadian Urban Dimensions, 1951 and 1961," *Canadian Geographer*, X (1966), 205-224; Robert H. T. Smith, "The Functions of Australian Towns," *Tijdschrift voor Economische en Sociale Geografie*, LVI, 3 (May-June 1965), 81-92; Qazi Ahmad, *Indian Cities: Characteristics and Correlates*, Research Paper No. 102 (Chicago: University of Chicago, Department of Geography, 1965).

External Relations Of Cities: City—Hinterland

Bart J. Epstein

As Harold Mayer has demonstrated in the first article of this series,[1] consideration of urban problems and relationships necessitates a definition of major terms. This is no less necessary in considering the external relations of cities.

Since the "real city"[2] extends to the limits of an urban density of settlement, a focus on what is beyond in relation to what is within leaves little other than agricultural production, extractive industry, and specialized points of manufacturing or recreation. These are important functions and are often vital to the existence of the city, but are hardly as vital and interesting as a more introspective view.

The urban population of the U. S. and of many parts of the world[3] is increasing at a spectacular rate. Since most of our cities in the U. S. (the major focus of the article) are past the days of great annexation possibilities,[4] growth has continued outside the corporate city limits, giving rise to the phenomenon we describe as urban sprawl.[5] Sprawl is hardly a new phenomenon; it is only recently that its problem value has been recognized and attempts made to control it. To some degree external relationships of cities are expressed in the process of sprawl and its physical and socio-economic characteristics. Our focus in this discussion will be on the corporate rather than the real city.

HINTERLANDS

A city's hinterland is a vast physical area compared to the city proper, and it performs a variety of functions.[6] Its major development is governed by the economics of space.

The size and complexity of the city will govern the size and complexity of its hinterland and the relationships between them.

Perhaps the simplest example of external city relationships to be found today involves settlements in agricultural areas. In the string of communities that dot the Rio Grand Valley in Texas, communities such as McAllen and Weslaco perform

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urban functions for extensive areas devoted to farming. These areas abut the urban settlements themselves.

The fact that there may be dominant cities which may extend their influence to lesser developed cities,[7] in no way detracts from the individual hinterland relationship.

At the other extreme is *the* megalopolitan city, New York, whose hinterland may well include not only Gottman's *Megalopolis*,[8] but possibly the U. S., North America, and, perhaps, the world.

HINTERLANDS AND URBAN FUNCTIONS

Somewhere between the two extremes used for illustration lies "the city" that will permit consideration of function and process at a useful and manageable scale. Omitted from consideration will be agriculture and extractive activities. Therefore, major concern will be with

1) Residence
2) Manufacturing
3) Distribution
   a) Wholesale
   b) Retail
4) Recreation
5) Personal and professional service (including government)
6) Communication and transportation.

Throughout each discussion, either stated or implied, will be the effects of the major catalysts for growth and functional differentiation—communication and transportation.

RESIDENCE

Commencing at the corporate boundary line of our "city," residential development describes the most obvious land use. This residential function was the earliest expression of extension of the city into its hinterland. Pressure on the land to accept greater numbers of urbanites is present today and show no sign of diminishing. On the simplest of terms—the hinterland is the catch-basin for the growing city as well as for its suburbs (both old and new).

This residential push, a centrifugal force,[9] is the result of many pressures. Our cities today are growing from both natural increase and immigration from rural areas and, to a minor extent, from abroad. Where the natural increase and immigration have increased Negro or Latin population, there has been an additional racial force which may ultimately effect substantial changes in city-hinterland relationships.

In addition to biological and racial pressures, there are also physical, socio-economic, and governmental pressures assuring a continued bedroom function for the city's hinterland.

Atmospheric conditions such as smog in the Los Angeles metropolitan area, the fouled air of New York City, the acrid odors of the chemical plants near Niagara Falls provide a physical incentive to escape the city and the affected parts of the metropolitan areas. Lack of enforcement of zoning and building codes may also produce urban building deterioration.[10] Temporarily, the slum may house a greater density than ever before, but ultimately there must be a physical spill-over, which is combined with the desire to escape to the hinterland. An additional social force considers association with the periphery of the slum undesirable, and thereby adds to the outward movement.

Another centrifugal residential force is socio-psychological—the search for the "good life." In middle class American terms this is the struggle to have one's own single family home on a green plot of ground, away from the "city" (nevertheless, seeking the creature comforts and services of the city). This outward movement, in which man attempts to up-

grade housing and improve his environment, is also evident in the movement from suburb to exurb.

Regardless of motivation or of physical or social impetus, residence in the hinterland is closely tied to the city; very often the tie is literal, even physical; i.e., via utilities. Population pressure develops in the city and the close-in hinterland, and the outer hinterland supplies the escape area. No doubt there are residents of the hinterland with only loose ties to the central city, but a trip on the Bayshore Freeway (San Francisco) or the West Side Drive (New York City) or the Southeast Expressway (Boston) any weekday morning will vividly demonstrate the tie to the central city. A lesser flow of traffic in early evening hours is also obvious, indicating yet another functional association. (See section on Recreation)

The dynamics of residence in a metropolitan area is not a one directional phenomenon. It is not only rural immigrants who settle in the central city, but also the affluent and the aged. Housing for the aged is commonly placed within the corporate city limits, very often near the central business district. Akron, Ohio, has just completed one group of apartments for the elderly within walking distance of 100 percent point;[11] St. Joseph, Michigan, has also completed an "old age" high rise apartment at the very edge of the central business district. Further, such housing developments as the West End project in Boston and Society Hill in Philadelphia have displaced low and moderate income families in substandard housing with higher income families in luxury apartments and town houses. A river setting and proximity to both the central business district and financial districts, and to all other central city amenities have made these developments a counteractant to the usual outward flow of population, albeit they constitute a relatively tiny force.

Nevertheless, the net effect of all forces is outward, thereby making residence the single most outstanding, most important urban function performed by the hinterland for the city. This may be an oversimplification of a complex relationship, but until we can exercise complete control over our environment and over urban development, we may look forward to more manifestations of the same phenomenon.[12]

MANUFACTURING

Historically, manufacturing has been a centralizing force (centripetal). From the early days of handicrafts and the Guilds through the Industrial Revolution, there was a banding together for purposes of production of goods. This phenomenon was common to agricultural production as well. Strong forces operating in the distant past through recent times kept a large share of manufacturing a captive of the inner city.

Development of ports and the spread of railroads permitted and encouraged a degree of decentralization, but did not develop the freedom of modern times. The automobile, the truck, and improved highways have indeed permitted and encouraged the diffusion of the manufacturing function beyond the corporate city and beyond the dominant influence of navigable water and railroad lines. There has been a liberation from restrictive locational factors.

It should not be inferred that there is only one set of forces at work. Surely, the development of Bethlehem Steel at Sparrows Point, in Baltimore's hinterland, was but slightly influenced by existing overland transportation facilities. The deep water port and the economy of water transportation in addition to proximity to substantial markets were prime location factors. Nonetheless, Baltimore's proximity was the ultimate key, since this was the home base of the labor

force, (despite the construction of a company town). The recent development of the aluminum industry, oriented to power, provides a somewhat similar situation.

These hinterland phenomena are being overshadowed today by the shifts taking place within the urban metropolitan areas. There are a variety of forces at work in decentralizing industry. Some of these follow.

Modern Design

There is a stress in most manufacturing production lines on single story operations (breweries are a major exception). This creates a need for extensive acreage for buildings alone. In Everett, Washington, Boeing has recently built a plant to produce the 747 jet; it is the largest building in the world, containing 160 million cubic feet.[13] Added to the land used by the structure is a substantial additional area for employee parking, trucking, and storage. This type of land need could not be satisfied in Seattle; consequently, the move was made to the hinterland (even within Everett the move was westward, peripheral to the built-up part of the city).

Modern Technology

At least two striking phenomena have been evident in recent years. Industrial engineers have been successfully diminishing air and water pollution and have also abated noise. This has made previously noxious industries into acceptable neighbors.

There has also developed a new type industry including cybernetics and electronics which can be housed in aesthetically pleasing structures which produce no smoke and no noise—only traffic and payrolls. There are also the research parks which resemble campuses rather than industrial complexes.

These developments have made it easier to decentralize production jobs, and have made production facilities more welcome in the hinterland.

Government Policy and Land Economics

Zoning is an instrument of public policy. By means of restrictive codes, manufacturing has been forced to areas within the city that are least desirable for any other use.[14] Combining this restriction with relatively small land holdings in the city and the relatively high prices for land acquisition, there results a great incentive to escape the city and to seek friendlier, more available opportunities outside—both outside the city and outside of its hinterland.

Taxation is inescapable, but its impact is manageable. Manufacturing is so desirable from the point of view of the community tax duplicate, that there will often be incentives to move it to a particular place. At least part of the motivation for the desertion of New England by the textile industry was a favorable taxation climate in the South. In any case, the hinterland often escapes the problems and the "costs of doing business" of the city, thereby permitting a friendly tax environment, enriching the hinterland and possibly adding to the financial problems of the city.

Labor

There is one other major force at work between the locus of manufacturing and a city hinterland spatial arrangement—labor. The simple act of increasing population in the hinterland, as described in a previous section, provides a varied labor force for wandering industry. For example, what better attraction might there be for needle trades to leave the city than a large potential female labor force in the suburbs? Skilled workers today earn enough to break the city bond. It is

no longer necessary to locate manufacturing facilities in the midst of densely built-up urban areas. The labor force is dispersed and perhaps most important is mobile.

In many cities there is a reverse commuter rush with the hinterland supplying the jobs for the city dweller. Metropolitan areas in the extreme east and west provide vivid examples: Route 128 in the Boston Standard Metropolitan Statistical Area is not only a Boston circumferential by-pass, but is a new industrial belt complete with industrial parks and more independent types of facilities; e.g., Polaroid. Most of the major arteries originally aimed at Boston can now be considered as spokes in the 128 wheel and carry the heavy flow of outward bound traffic that eventually feeds into the circumferential. Equally striking has been the development of automotive industry in Fremont, California, in the southern part of the Bay Area. The Bayshore together with the Nimitz and the more local San Jose roads feed large numbers of commuters to these plants. These workers are in addition to the local inhabitants who have recently moved to be close to work and to the general developmental excitement in this new area.

DISTRIBUTION

The distribution of goods is a function shared by the city and its hinterland. In the recent past, the city had a virtual stranglehold on wholesaling and an even stronger hold on sales of general merchandise to the consumer (especially department store sales). The post-World War II era has witnessed noticeable changes in both re-distribution (wholesaling) and direct distribution to the consumer (retailing).

Wholesaling[15]

In many respects wholesaling's history resembles that of manufacturing; perhaps it was responsive to physical and transportation centrality to an even greater extent. So long as urban relationships remained simple, wholesaling was keyed to primary transportation networks. Goods arriving by sea or rail were assembled at or near the central place and then organized for re-distribution. (Witness the old wholesaling areas associated with a port, railroad yards, or the central business district itself.)

Additional pressures due to increased population that was more dispersed than ever, a cost price squeeze experienced by all business, an accent on truck transportation within metropolitan areas, congestion within the city, taxation problems (real property and inventory)—all of these forces were at work and decentralization has taken place.

Just as there is reverse commuter traffic, there is a reverse wholesale traffic. Modernization and automation of goods handling facilities have created the need for "assembly line" type efficiency. Indeed, the modern wholesaling or distribution center today resembles the modern manufacturing plant. Sprawling single story buildings with substantial service area acreage is the rule today, and land (and other) pressures have brought this redistributive function to the hinterlands. The city has not abdicated its redistributive role completely. Defensive action such as the South Philadelphia Distribution Center and the new Boston Market attempt to reverse the new tide. There are, indeed, advantages to a central city position, but the "lock" is broken and the hinterland now shares this vital function.

Retailing

Perhaps no other phenomenon of the post-World War II era is as striking as the retail revolution. Its basic element has been described in the previous sec-

tion on residence, and since most people with their greater disposable incomes to spend have been caught up in its wake, they have experienced the changes and played an important part in it.[16]

The central business district is, and has been, the epitome of commercial development in our cities.[17] Its dominance in an area can be appreciated by shopping there or by making a simple map analysis. In almost all cases the central business district can be located by inspection of the transportation network. Certainly, most main roads lead there and often a railroad confluence is also nearby. This commercial hub was most easily accessible to the city's population and to its hinterland as well—as long as the hinterland was relatively close-in. Here we find the super stores—department stores—with the widest range of goods and services offered in the total market place. These stores are almost always the highest sales producers in a metropolitan area. They are the "unreproduceables," at least on a store-to-store basis. Here, too, is found the widest range of speciality stores, the greatest concentration of furniture stores (at the periphery), and the greatest concentration of services. The city and its hinterland have provided the market upon which these developments depend. Most of the goods purveyed here are commonly called "shopper's goods."[18]

Together with the spread of population (sprawl) has come substantial retail development. Early retail development outside the central business district (described by Proudfoot)[19] has been accompanied by a phenomenon of the forties and more recent days—the planned shopping center. Historically, business has developed in conjunction with its markets. (Witness the proliferation of stores along old street car lines such as Lake St. in Minneapolis and the present day extension along major roads.) Most of the development centered on "convenience goods"[20] with an occasional shopping goods concentration at points where major transportation lines met and crossed (Coolidge Corner, Boston). This built-in hinterland potential has been met in a variety of ways, among them the planned neighborhood shopping center and the planned community shopping center. These developments are little more than a response to meet a mobile, mechanized market potential as close as possible to where it resides. The city dweller rarely crosses into the hinterland for this type of shopping trip, with one possible exception—the discount department store with its discount supermarket associate.

The discount store is a "child of the city." It originated in the deserted mill buildings of the central cities of New England, attracting its business in much the same fashion as a small central business district.[21] The rapid acceptance of the "new" type of merchandising (surely influenced by the super-market) encouraged discount store entrepreneurs to leave for the hinterlands, where they could get cheap land and escape restrictive building codes (and perhaps the union as well), and started a helter-skelter pattern of store facilities in the hinterland. It did not take long for competition to weed out the poorly financed and the poorly located.[22] After greater and greater acceptance, the discount store became respectable and sought better locations, even within the city itself (e.g., Alexander's and E. J. Korvette in downtown New York). These latter moves are restoring an equilibrium, keeping city business potential within the city (away from the hinterland) and even attempting to capture some hinterland sales potential when the suburban dweller "comes to town."

Bureau of Census data[23] and Urban Land Institute[24] studies have described

the most revolutionary retail force of the sixties and its effect on the city—the planned regional shopping center. Although the central business district is still the single largest, highest sales volume shopping centrality in the standard metropolitan statistical area, it has not kept is share of market and is being overshadowed by the regional centers. Some of the loss in position is no doubt due to lack of central city growth, especially compared to the hinterland. (But rising incomes have at least balanced the loss, and the total effect is still a loss of position.) Whereas the neighborhood and most community centers are self supporting within the hinterland, the regional center taps both city and hinterland market potential.

Most regional shopping centers are situated at key access points and provide free (and adequate) parking for all customers. For many shopping trips this ease of access draws trade from a wide variety of areas.

Further, the location of department stores within a short walking distance, combined with attractive walkways where frontage is occupied by specialty stores makes shopping more efficient than in the central business district where distance, traffic, vacancy, and the elements provide deterrents to shopping ease.

Regional centers which started by featuring one department store (e.g., Shoppers World—Framingham, Massachusetts, orginally Jordan Marsh) have now worked their way up to as many as four (naturally passing through the 2- and 3-store stage) department stores (e.g., Yorktown Mall, Lombard, Illinois: Montgomery Ward, J. C. Penney, Wieboldt's, and Carson, Pirie, Scott) occupying centers with over one million square feet of space.[25] Further enhancing the regional center is its most recent innovation: the enclosed, air-conditioned mall. This single development may provide the most serious impact on the central business district. Cities such as Rochester, New York, and Green Bay, Wisconsin are already geared to meet this attack, but most central cities will not be as fortunate.[26] The enclosed, air-conditioned mall provides a controlled environment both winter and summer, as well as a wide range of goods and services. With strategic location and vigorous sales promotion, these centers will keep more business out of the central business district and will also attract present CBD business into the hinterland. This does not suggest the death of the central business district (it is still virtually impossible to duplicate), but may yet force a new function upon it. In any case, the regional shopping center has, in its way, reversed the traditional flow of retail dollars.

RECREATION

A consideration of recreation within the urban complex once again illustrates centrifugal and centripetal forces. As in retailing, the forces are powerful, but perhaps not as competitive (except for the competition for the total recreational expenditure in the market).

Centripetal

A major portion of nighttime activity in the central business district is associated with recreation—entertainment. New York's "Broadway" may be too overpowering an example to cite, but surely it is no less typical than San Francisco (with its North Beach complex as an additional lure) or Toronto (with its recent addition of the O'Keefe Center to an already highly developed nightlife complex including Bay-Bloor and the central business district), or "any city" with its concentration of movie theaters, night clubs, restaurants, and hotels. (Las Vegas is perhaps the gaudiest example of

this phenomenon.) As in shopping and in personal services, the central business district is also the bright light mecca for the standard metropolitan statistical area. Indeed, the trading area for entertainment centers may even be national in extent—Broadway and Bourbon Street certainly serve broader areas than the New York and New Orleans standard metropolitan statistical areas.

Centrifugal

Just as the city provides a concentration of recreation facilities unmatched elsewhere in the Standard Metropolitan Statistical Area, so does the hinterland have its peculiar characteristics. Whereas there is rarely a concentration of facilities, there is a great variety dispersed through the hinterland, parts of which cannot be matched by the city.

Recreational opportunities and facilities will often occur in a considerably larger hinterland than has been used to this point. Home recreational facilities such as those that lawn and garden may provide are important, but highly localized, and not comparable to the commercial aspect of recreation found in the city.

Perhaps the *cash* factor provides an initial point from which to progress. Open land, except for occasional green strips within the city, is the most important and striking feature offered by the hinterland. Most often it is here that the city dweller can find camping, boating, swimming, and other outdoor activity. It is here that scenic views can be found. Here "nature" is displayed for the citizen accustomed to a manmade environment. Some of this may be free, but there is a commercialized segment of this phenomenon that attracts sales as well as participants.[27] This pull outward generates sales as well as traffic, and also supplies a service virtually impossible to obtain in the city.

The city's hinterland should not be inferred to be barren of "city functions." The differentiation is one of concentration. We can all find examples of the fine restaurant nestled in a rural setting or even associated with a new shopping center. We are familiar with the summer theater and the outdoor performing centers such as the Blossom Center between Cleveland and Akron, Ohio. Although dispersed spatially, they nevertheless draw "trade" from the city, where these facilities are not available (despite the seasonal nature of some of these recreational activities).

Today there is a rebirth of the motion picture industry and the movie theater. The TV doldrums which resulted in the abandonment of many downtown movie houses have finally been passed. Where Hollywood and others are supplying film matter impossible (at least temporarily) to present on the TV screen, the cinema entrepreneurs are providing new, "slick" theaters for the viewing public, but mostly outside the central city. We may even find twin theaters, very often within shopping centers which once discouraged their association.[28] This, of course, is a variation of an older phenomenon which has been the property of the hinterland—the drive-in theater. These developments have had their greatest effect where the central business district did not have a well-developed or modern entertainment center.

There is two-way traffic in recreation. The stream of cars coming into the city at night is partially balanced by the Sunday exodus, each area performing the services that it can do best, but there is an overlap despite specialization.

SERVICES (PERSONAL, PROFESSIONAL, AND GOVERNMENTAL)

The dominance of the central city has been challenged on many fronts. Medi-

cal specialists, lawyers, and craftsmen are leaving their traditional locations in order to be closer to (or more convenient to) their growing markets. It is no longer unusual to see large office buildings under construction in even the most distant parts of the suburbs.

Again, it is the residential sprawl from the city which creates concentrations of sufficient size to warrant establishment of hospitals and their associated medical facility concentrations outside the central city area. It is the increased efficiency in communication that permits attorneys to leave the central business district and also permits insurance companies to erect large complexes in the hinterland (American Mutual Insurance Co.—Wakefield, Massachusetts). Despite the outward move, the central business district and the central city still have the greatest concentration of office space and the greatest concentration of all types of service specialists. The ambulance with an emergency case most often is inbound, as is the man with business problems. Even those specialists who leave the central area often do not cut their ties completely, for they operate dual office facilities. Regardless of proliferation of facilities outside the city, there is still a basic centripetal power which is exercised on the whole metropolitan complex.

Just as the concentration of hospitals in the inner city draws the medical profession, so does the concentration of government draw the attorney, the accountant, the realtor, the title company, and the architects, engineers, and other business service professions. Even without metropolitan government, the seat of power is most often in the city. Where else can one find the legislative, judicial, and executive functionaries of government together with the economic giants such as banking and finance? Whether the smaller communities in a metropolitan complex admit it or not, they are dependent on the city. The hinterland dwellers may believe they escape physical contact with city problems, but it is an illusion. This has been recognized by the federal government and the metropolitan areas in the establishment of planning areas for transportation studies underway in almost every metropolitan complex. Toronto has established a form of metropolitan government, as has Dade County, Florida (Miami). In many other areas metropolitan commissions are concerned with a variety of problems such as transportation, law enforcement, and supplying public utilities.

City planners have been most sensitive to the needs for supra-government in our metropolitan areas. Suburbanites guard their governing rights most zealously, but they are still affected by the actions of the city and one day must yield to its dominance. Perhaps a first step is the income tax (variant of a head tax) now levied on "outsiders." Lest the residents of the hinterland think there is escape, they may well read a short article in *Atlanta Magazine*, an organ of the Atlanta Chamber of Commerce, by Opie Shelton entitled "The Day That Atlanta Disappeared."[29]

There has always been a dispersion of service activity concommitant with a dispersion of population (the market). Despite the growth (relative and actual) of medical, legal, and personal services in the hinterland, the basic thrust and orientation is inward. The central business district and the central city have strong attractive forces, and overshadow the equivalent activities in the hinterland.

COMMUNICATION AND TRANSPORTATION

Communication

Communication is the unifying influence on the metropolitan or even megalopolitan area. Its role in permitting func-

tional differentiation both within and without the city has been demonstrated amply. Nevertheless, there are special points to be made regarding this extremely complex phenomenon.

Communications are possibly the most centralized urban function. Recognizing that NBC in the Los Angeles area operates from "beautiful downtown Burbank,"[30] it is more common to find radio and television studios centralized in the city.

The centralizing power of airborne communications should be recognized by all of us who live outside the corporate city limits, or for that matter, outside the urbanized area.[31] New York's radio and television signals invade Connecticut and New Jersey; Los Angeles stations can be heard in Redlands; cable television brings in signals from even greater distances. City news and city phenomena are distributed outward. In many areas the big city stations, both radio and television, even present the farm news! It would be difficult to measure the effect of these media in establishing a metropolitan identity, but surely they must create at least a metropolitan awareness and character.

Newspapers function the same way in their preparation and publication. Although there may be a proliferation of daily and weekly newspapers throughout a metropolitan area, the major media are central city citizens. Within the past 10 years this writer has witnessed the movement of two large newspapers, the Boston *Globe* and the Boston *Times Herald*, from the central business district to other close-in central city locations. Employment in this medium is drawn from all parts of the metropolitan area. The product originates centrally and is dispersed through wide areas.[32]

Newspapers, radio, and television are all unifying phenomena. They provide a vital link between city and hinterland, one that operates in both directions but which is centered on the city.

Certainly, telephone communication, regardless of the location of equipment or offices, has fostered urban growth. It is possibly the most important factor permitting decentralization of population, business, industry, and virtually all major urban activities.[33]

Transportation

The most visible and critical communications medium is transportation. Our homes are surrounded by streets which, in turn, lead to highways and terminal type facilities. Indeed, it is this means of circulation associated with the automobile that has formed our cities and metropolitan areas.[34] These surface phenomena are most obvious to us, and the recent creation of a Department of Transportation and the recent federal requirements for transportation studies underline their importance in understanding and planning the city (real city).

Rail and rapid transit—the important pre-automobile surface lines—have played relatively minor roles in recent years. However, as the need for parking facilities increases, as congestion becomes more severe, and as air pollution becomes a greater problem, we find renewed interest in this mode of travel. Although the Japanese have led the way recently, the American cities are now awakening. In the Boston area the Massachusetts Bay Transit Authority has begun functioning during this decade and has returned rail commuter service to the South Shore and added it to the western suburbs. The Bay Area Rapid Transit System has been having difficulties, but is proceeding with development of a new system for the San Francisco-Oakland Metropolitan area. Los Angeles held a referendum on November 5, 1968 regarding a beginning on a rapid transit

system. That these lines operate both in and out of the city needs no elaboration, but the major function is to get the hinterland dwellers into the central city for work and play, and then return them home. This type of development, together with the development of the Northeast Corridor rail commuter service will make the hinterlands even more attractive to the city escaper.[35]

Intercity, transcontinental, and intercontinental travel have created problems that the hinterland must solve for the city (and the metropolitan area as well). Air travel and the development of bigger and better planes has created traffic jams as dramatic as the "freeway rush." New York's commercial air traffic must be handled by three airports—two in the city proper and the other in Newark, New Jersey. The need for a fourth facility already exists. Surely, if political considerations can be sublimated, it will be planned in a hinterland location. Whether the airport represents a city exclave or not, new facilities must be placed farther from its center.

Although Chicago is now considering construction of a new air terminal in Lake Michigan, it long ago replaced Midway with O'Hare.[36] Dallas and Fort Worth have finally decided to cooperate in operating a joint airport between them. Kansas City is in the process of replacing a small "downtown" airport with a modern supersonic-capability airport in the northern part of the standard metropolitan statistical area. Dulles Airport, 50 miles from Washington, D.C., is finally receiving some of the traffic for which it was designed. Surely it will replace National as the major airport for Washington, D.C. Here, too, there was experiment which was perhaps too early. Friendship Airport between Washington and Baltimore has not become for D.C. what might have been expected; rather, it is Baltimore's airport.

Airports and airport problems are not restricted to any part of the country or the world. It appears that we may look forward to a decentralization of the large jet ports which, in turn, may be connected to the central city by smaller local airports serviced by helicopters or STOL craft.[37] The hinterland is already performing a "break of bulk" function for the city and is likely to increase that particular function.

CONCLUSION

City-hinterland relationships cover the whole range of economic and social functions within the metropolitan complex. Whether or where a line is drawn creates the initial and major problem in delineating inside vs. outside functions and relationships. The major focus in this chapter has been on the administrative boundary line. This focus is on intra-metropolitan phenomena. Had the line been drawn at the extreme of the urbanized area, a new set of problems would arise, but they would still fit the major categories discussed here.

There are no self-sufficient cities or metropolitan areas. Neither are there completely static situations. Cities are in a dynamic equilibrium with their hinterlands and their total environments. Analysts may stop the action momentarily to view relationships, but they must recognize that such relationships are ever changing. These are entities whose limits are indeterminate.

FOOTNOTES

[1] Harold M. Mayer, "Cities and Urban Geography," *Journal of Geography*, Vol. LXVIII, No. 1 (January 1969), 6-19.

[2] For a brief discussion of the "Real City" or "Geographic City," see Raymond E. Murphy, *The American City* (New York: McGraw-Hill Book Company, 1966), pp. 13-14.

[3] Statistics are available in United Nations Publications. Note also Gerald Breese, *Urbanization in Newly Developing Countries*

(Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1966), pp. 1-32.

[4] Major exception is Jacksonville, Florida, which on October 1, 1968, spread its corporate boundaries to the Duval County Line, making it the largest areal city in the United States.

[5] Planning literature on sprawl is abundant, for a geographer's viewpoint see Jean Gottman and Robert A. Harper (editors), *Metropolis on the Move: Geographers Look at Urban Sprawl*, (New York: John Wiley & Sons, Inc., 1967).

[6] For a brief discussion of hinterland concepts see Raymond E. Murphy, *The American City* (New York: McGraw-Hill Book Company, 1966), pp. 52-71.

[7] A useful source for central place studies is Brian J. L. Berry and Allen Pred, *Central Place Studies, A Bibliography of Theory and Applications, Including Supplement Through 1964* (Philadelphia: Regional Science Research Institute, 1965). For a review of central place systems, see Brian J. L. Berry, *Geography of Market Centers and Retail Distribution* (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1967), pp. 1-25. Note also that this latter publication points to a lack of theory development within the metropolitan complex.

[8] Jean Gottman, *Megalopolis: The Urbanized Northeastern Seaboard of the United States* (New York: The Twentieth Century Fund, 1961).

[9] Charles C. Colby, "Centrifugal and Centripetal Forces in Urban Geography," *Annals* of the Association of American Geographers, XXIII (1933), 1-20.

[10] In addition to urban renewal, planners are seeking to rehabilitate the city by enforcing building codes. Proper code enforcement might have initially acted as a great deterrent to slum development.

[11] The 100 percent point is usually regarded as the point of highest land value in the city. It is most often at the key traffic intersection of the central business district.

[12] It may be fair to ask if much of present day zoning is not in effect producing controlled sprawl!

[13] Seattle-First National Bank, Annual Review: *Summary of Pacific Northwest Industries*, May, 1967.

[14] Manufacturing has rated very low on the scale of land use quality. In old zoning codes it was possible to build higher rated uses on lower rated land. It is more common today to find exclusive manufacturing zones which may be used for nothing else. Nevertheless, manufacturing is still delegated to lands undersirable for residence or commerce.

[15] For a definition of wholesaling, see Bureau of the Budget, *Standard Industrial Classification Manual* (Washington, D. C.: United States Government Printing Office, 1957), Code 51.

[16] For a discussion of the relationship between retailing, population and sprawl, see Bart J. Epstein, "The Trading Function," Jean Gottman and Robert A. Harper (editors), *Metropolis on the Move: Geographers Look at Urban Sprawl* (New York: John Wiley & Sons, 1967), pp. 93-101.

[17] A landmark study of the central business district by American geographers is Raymond E. Murphy, James E. Vance, Jr., and Bart J. Epstein, *Central Business District Studies* (Worcester, Massachusetts: Economic Geography, 1955).

[18] Shopper's goods satisfy long term needs and are bought relatively infrequently—as shoes and apparel, furniture and household appliances.

[19] Malcom J. Proudfoot, "The Outlying Business Centers of Chicago," *Journal of Land and Public Utilities Economics*, XIII (1937), 57-70.

[20] Convenience goods are necessities which are bought frequently as food, kitchen supplies, liquor, and notions.

[21] The discount store has evolved into the self-service department store, and has been accounting for an increasing share of the general merchandise sales dollar.

[22] *Discount Store News*, a weekly newspaper, chronicles the events of this new retailing industry. In recent years there has been a great deal of news on corporate mergers. Previously, equal space was concentrated on business failures (for a variety of reasons).

[23] Bureau of the Census, *Major Retail Centers, 1963 Census of Business* (Washington, D. C.: United States Government Printing Office, 1965). This is a series of reports on SMSA's, CBD's, and MRC's for selected areas.

[24] The Urban Land Institute has published a series of reports on shopping centers; some of which are:

1) Technical Bulletin No. 33, Homer Hoyt, *A Re-examination of the Shopping Center Market.*
2) *The Dollars and Cents of Shopping Centers*—Parts I and II.
3) *The Dollars and Cents of Shopping Centers*—1963 and again 1966.

Note also that Saul B. Cohen prepared an annotated bibliography on shopping centers for the Kroger Company which was published for

limited distribution in the mid-1950's. These may still be available on a limited basis.

[25] Yorktown Mall will not have a great impact on Chicago proper, for it will attract only the occasional shopper who may be drawn to the shopping center by curiosity.

[26] Rochester, New York has already built a downtown, enclosed mall on a small scale. Green Bay, Wisconsin's downtown urban renewal plan calls for creation of an extensive downtown, enclosed mall with a special circumferential traffic pattern including tunnels for north-south through traffic (under the mall).

[27] Usually, sight seeing traffic is carried by "old type" roads which have had limited control of roadside development. The souvenir shop, gas station, restaurant, and produce stands all capture city dollars.

[28] Theaters were once on the undesirable tenant list in shopping centers, especially where parking was a problem. Long term parking during peak shopping periods was the chief problem created by the theater. Today, shopping centers are attempting to perform more community functions and encourage establishment of theaters in order to foster additional trips to the center. The General Cinema Corporation of Boston has been a leader in this recent theater surge, in many cases establishing twin theaters within the planned shopping complex.

[29] The historians later called it the greatest unexplained phenomenon in the history of the world. No one disputed their claim.

Imagine, one day there sat Atlanta, dynamic and bustling, one of the nation's greatest cities. The next morning it was gone, having disappeared during the night without leaving the slightest smidgen of a clue behind.

Gone were the towering office buildings, the banks, the stores, the public utilities, the factories, the hospitals, the schools, the colleges and universities, the centers of culture, the stadium, the homes, the people, the churches, everything.

The suburbs were left untouched. But when early risers attempted to turn on the water, nothing happened. Neither would the electric lights turn on. Their battery-powered radios offered a hint of things to come. Only a handful of the radio stations were on the air, but there was nothing on their news tickers about what had happened during the night.

It was only when these suburbanites headed to their downtown jobs that they actually became a part of the nightmare. As they reached the city limits they suddenly were jolted by the scrub trees and weeds which stood where only yesterday had been a majestic city.

Panic followed.

By word of mouth, the news spread. ATLANTA HAS DISAPPEARED!

Some of the less enchanted chorused, "Good Riddance!" A few said, "Well, we finally got rid of all of the niggers."

But the masses didn't join in the chorus.

Those who went to their jobs in the suburbs found the doors of most establishments locked. Lockheed had posted a notice, saying that all of their skilled engineers and scientists had resigned en masse, leaving to accept their choice of dozens of other jobs in other areas. The same was true of the automobile plants and of most of the other job producers of the suburbs.

It took a few days for the original shock to wear off. Then came the mass exodus.

The young and talented pulled up roots and headed for other cities to seek their fortune. The displaced college students began knocking on other college doors, seeking admittance. Doctors and dentists packed up their tools and left. Anyone who could joined the exodus. Soon all that was left were the very old, the feeble, the untrained and the unskilled.

Within one year's time from The Day That Atlanta Disappeared the once prosperous suburbs lay prostrate. Homes were boarded up and abandoned. The automobile had become the only means of transportation available. No longer was there the sound of jetliners or trains. The few stores that were left did little business. No one was moving in, only out.

In short, these once flourishing suburbs had taken on the same desolate look which marks so many of the decaying and dying towns over the nation.

There were acrimonious afterthoughts.

"Perhaps we had more stake in the well being of the core city of Atlanta than we were willing to admit," some said.

But, alas, it was too late to turn back.

On The Day That Atlanta Disappeared the suburbs became doomed to a slow but sure death. The umbilical cord which had fed them had been severed.

Oh, if only those people had understood that the fortunes of their city and their suburbs were inextricably tied together. Opie L. Shelton, "The Day That Atlanta Disappeared," Reprinted from *Atlanta Magazine*, April 1966.

[30] The recent NBC comedy show, "Laugh In," has made this facility one of the best known in the nation.

[31] For a definition of urbanized area, see Bureau of the Census, *United States Census of Population: 1960* (Washington, D. C.: United States Government Printing Office, 1961). Definitions are in the introduction.

[32] The Audit Bureau of Circulation publishes circulation data—numbers and places—for newspapers subscribing to the service. These data may be obtained at the newspaper general office.

[33] Note that telephone call data are considered

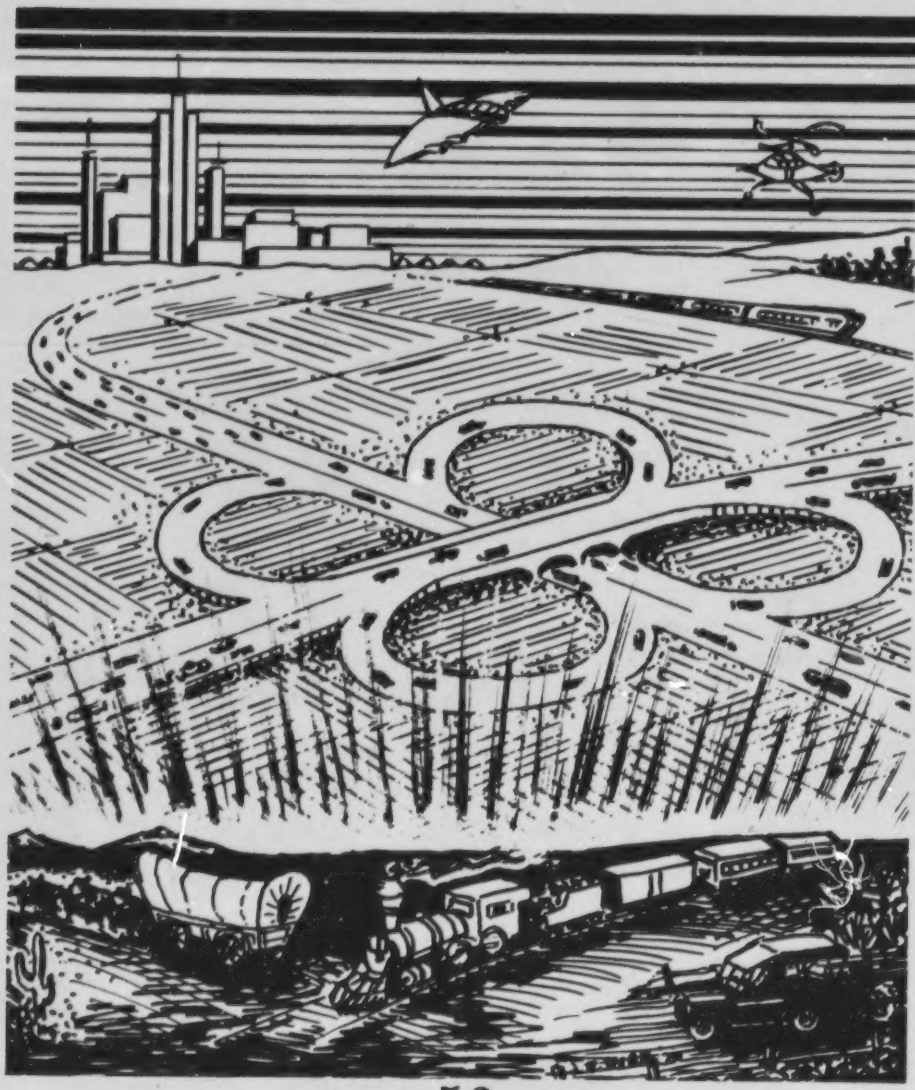
by the Bureau of the Census in its definition of standard metropolitan statistical areas.

[24] For a recent discussion of Ekistics, see C. A. Doxiadis, "Man's Movement and His City," *Science*, CLXII, No. 3851 (October 18, 1968), 326-334.

[25] The Department of Transportation has taken the lead in developing high speed rail transportation between Boston, New York, and Washington, D. C.

[26] After virtually abandoning Midway for commercial flights to Chicago, a number of airlines have recently re-established service there. This change has been due to the traffic problems at O'Hare, and has been fostered by the development of jet aircraft that can safely use Midway's shorter landing strips.

[27] Great emphasis has been placed on development of Short Take Off and Landing aircraft, both conventional and vertical. These craft have been very busy on commuter runs to and from Los Angeles International Airport, supplementing and possibly supplanting helicopter service at some Los Angeles metropolitan area airports.



The Form And Structure of Cities: Urban Growth Patterns

Howard J. Nelson

A modern visitor strolling down Duke of Gloucester Street, the main street of Colonial Williamsburg, passes mainly private dwellings—single family detached houses large and small. But interspersed among then in an apparently random pattern are various retail shops, service centers, and small manufacturers, several taverns and inns, a apothecary shop, a printing office, a milliner, a clockmaker, a boot maker, a wigmaker, and so on. At one end of the tree shaded street, not more than three quarters of a mile long, is the old capitol of Virginia, and at the other, the college of William and Mary. Although today's buildings are merely restoration copies of the originals, many are built on the old foundations, and attention to authenticity is apparent. In all likelihood this mixture of residence, commerce, craftsmen, and public activity accurately portrays the undifferentiated structure of early American cities.

But the structure of cities in this country has changed markedly through the years. Today, even small towns with a population of 1,500 or so (the approximate colonial population of Williamsburg) show definite internal differentiation. Typically commercial establishments form a closely spaced cluster along a section of the main street, a lumber yard or other bulk handling facility is located next to a railroad or highway, and a small factory or two are attached to the same transportation lines near the edge of the town. The residential areas form their own districts, adjacent to, but apart from, the rest. And in larger cities an immensely complicated urban structure has developed, a constantly changing but delicately balanced areal organi-

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zation composed of many highly specialized districts with complex linkages, the product of a variety of forces operating through several centuries.

The casual observer, in today's era of extensive travel, is perhaps first struck by the unique features of individual American cities. These characteristics that give each city a personality are often attributable to the physical qualities of the site or a distinctive historic past: the compact, hilly, water-encircled site of San Francisco, the level lake plain of Chicago, the charming Vieux Carre section of New Orleans, or the open squares in the street pattern of Savannah. But the more perceptive traveler soon begins to notice a repetitive pattern in the form and structure of our cities, and becomes almost instinctively aware of a kind of "normal" location of specialized districts, and of associations of activities within them. For, in fact, American cities have developed a highly stylized arrangement and characteristic, repetitive interrelations among the specialized areas that constitute their urban anatomy.

FACTORS IN THE GROWTH PATTERNS OF AMERICAN CITIES

The form and structure of the modern American city is the result of numerous economic, social, and cultural factors operating through the many decades since the evolution of the simple forms like Williamsburg. The forces contributing to the contemporary urban structure are many, some are obvious and strong, others are more subtle, but all add an important dynamic quality to urban development. Some of the most significant of these factors include rapid and massive growth, a heterogeneous population, the persistent desire of Americans for a single family detached house, and the changing forms of urban transportation. The amazing affluence of Americans in recent years has accelerated change.

American cities are the product of rapid and almost continuous growth. In 1790 about 200,000 people lived in urban places (over 2,500 population), by 1890 the figure was 22,000,000, in 1960 it was 125,000,000. The population increase of our cities in the 1950-1960 decade exceeded the total population of all urban places in 1900. Between 1930 and 1969 the urban population has about doubled. As a result, there has been an almost frantically rapid building and rebuilding of the structures that form our urban plant. With increasing populations cities have not only expanded areally in all directions, but urban lands in general, and favored locations in particular, have increased enormously in value, making rebuilding for a "higher use" profitable. Rapid growth has resulted in uncommonly dynamic cities, with constant change, sorting out, and filtering down in every section of the city.

The American urban population has not only been growing but it also has been unusually heterogeneous, resulting in many distinctive neighborhoods and much internal migration. In the past, much of the population variety was the result of a series of waves of migration. There was, for example, a heavy immigration from Ireland after 1847, another wave from Germany after 1852, and a tide of immigrants from other European countries beginning in the 1880's and continuing until about 1920. The ethnic neighborhood was common. Often the newer immigrants replaced the older groups in the oldest sections in the inner city as the earlier arrivals prospered and moved further out to newer homes. During and since World War II urban growth came mainly from migration from rural areas and included both whites and blacks, but with the blacks in many cases moving in typical fashion into the older homes in central locations in neighborhoods being abandoned by slightly more affluent residents. This suc-

cession of peoples results not only in shifts in living quarters, but also in changes in shops, schools, and churches. But even where assimulation has taken place, American cities remain heterogeneous, with segregation by income replacing that of ethnic group or race.

The deeply ingrained desire of Americans to own a single family house on a large open lot is a further factor influencing the structure of our cities. Regardless of the psychological origin of this drive—the difficulty European immigrants experienced in owning such a structure in Europe, the pioneer tradition of a cabin in a clearing, the dispersed farmhouse familiar to the rural migrant, or notions about privacy, play space, and the nature and meaning of the family—the detached house has persisted for two hundred years in American cities. Whenever he can afford it, the American urban dweller appears to prefer ample space and a private yard over a short journey to work. Encouraged by governmental mortgage policy, perhaps as many as 15,000,000 single family homes have been built since World War II, mostly in suburban areas. These low density residential neighborhoods, covering vast amounts of space, and affecting patterns of commerce and industry, are a prominent and unique item in the American urban structure.

Urban transport not only laces the urban structure together, but it also profoundly affects the arrangement and function of elements in the structure of the city. In America, the horse-drawn omnibus was important from 1830 to 1860, the suburban railroad from 1850 on in the largest cities, cable cars from 1860 to 1890, and elevated rail lines and subways from around the turn of the century. The most universal transport medium from 1890 to about 1945 in all but the largest cities was the electric "street car." But the revolutionary transportation development of the twentieth century has been the spectacular rise of the automobile. There were only about 8,000 automobiles in America in 1900, less than 500,000 in 1910, about 8 million in 1920, but the number has risen spectacularly from about 25 million in 1945 to more than 70 million cars and 13 million trucks and busses today. And each automobile, on the average, is driven more miles every year. The effect on urban structure of this new private form of transportation, not confined to fixed routes, but with the vehicle requiring storage space near the driver, has been immense.

Impressed with the dynamic nature of the American city even before some of the factors just mentioned were operating at maximum strength, one geographer, Charles C. Colby, felt that two opposing forces could be identified. They were centrifugal forces that impelled functions to migrate from the central areas of the city to the periphery, and centripital forces that tend to hold certain functions in the central zone and attract others to it.[1]

Centripetal forces, Colby said, are the result of a number of attractive qualities of the central portion of the city. One of these is *site attraction*, often the quality of the natural landscape that invited the original occupance, such as a river crossing or a deep water landing. *Functional convenience*, a second force, results from the possession of the central zone of maximum accessibility, not only to the metropolitan area, but often to the entire surrounding region. The concentration of

[1] Charles C. Colby, "Centrifugal and Centripetal Forces in Urban Geography," *Annals* of the Association of American Geographers, XXIII, 1 (March 1933), 1-21. The article has been reprinted in what may be a more accessible source: Harold M. Mayer and Clyde F. Kohn, eds., *Readings in Urban Geography* (Chicago: The University of Chicago Press, 1959), pp. 287-298.

one function in the central zone operates as a powerful magnet attracting other functions. This is called *functional magnetism*. Thus a large department store may attract a swarm of ladies apparel and accessory shops. *Functional prestige* stems from a developed reputation. One street may become famous for its restaurants, another for its fashionable shops, and doctors often cluster for reasons of functional prestige.

Centrifugal forces on the other hand are not only opposite forces, but are made up of a merging of influences—a desire to leave one part of the city and the urge to go to another. Five forces are recognized. One is the *spatial force*, when congestion in the central zone uproots and the empty spaces of the other zones attract. The second is the *site force*, which involves the disadvantages of the intensively used central zone in contrast to the relatively little used natural landscape of the periphery. Another, the *situational force*, results from the unsatisfactory functional spacing and alignments in the central zone and the promise of more satisfactory alignments in the periphery. Then there is the *force of social evolution* in response to which high land values, high taxes, and inhibitions growing out of the past create a desire to move and the opposite conditions in the newly developing periphery provide an invitation to come. Finally, the *status and organization of occupance* creates a force for change, in which such things as the obsolete functional forms, the crystallized patterns, the traffic congestion, and the unsatisfactory transportation facilities of the central zone stand in opposition to the modern forms, the dynamic patterns, the freedom from traffic congestion, and the highly satisfactory transportation facilities of the outer zone.

Well aware of the importance of human choice, Colby added another factor which he called the *human equation* that could work either as a centripetal or a centrifugal force. Although today other forces may also be at work, these concepts are still useful in analyzing the dynamics of cities. In addition, more formal models of city structure have been constructed by other students of cities, sociologists, economists, and geographers. Three of the most famous of these constructs follow.

CLASSIC MODELS OF CITY STRUCTURE

The earliest (1923) and best known of the classic models is the concentric circle or zonal hypothesis of Ernest W. Burgess.[2] The essence of this model is that as a city grows it expands radially from its center to form a series of concentric zones. Using Chicago as an example, Burgess identified five of these. In the center of the city was Zone I, the *central business district* or CBD. The heart of the CBD contained department stores, style shops, office buildings, clubs, banks, hotels, theaters, and civic buildings. Encircling it was a wholesale district. Zone II, the *zone in transition*, surrounded the CBD, and comprised an area of residential deterioration as the result of encroachments from the CBD. It consisted of a factory district as an inner belt, and an outer belt of declining neighborhoods, rooming house districts, and generally blighted residences. In many American cities of the 1920's, this area was the home of numerous first gen-

[2] First presented as a paper in 1923, Burgess restated his hypothesis at somewhat greater length five years later. Ernest W. Burgess, "Urban Areas," in T. V. Smith and L. D. White, eds., *Chicago: An Experiment in Social Science Research* (Chicago: University of Chicago Press, 1929), pp. 114-123. An excellent contemporary review of the Burgess model is Leo F. Schnore, "On the Spatial Structure of Cities in the Two Americas," in Philip M. Hauser and Leo F. Schnore, eds., *The Study of Urbanization* (New York: John Wiley and Sons, Inc., 1965), pp. 347-398.

eration immigrants. Zone III, the zone of *independent workingman's homes* was the next broad ring, at the time largely inhabited by second generation immigrants, and characterized in Chicago by the "two-flat" dwelling. Beyond this ring was located Zone IV, the *zone of better residences*. Here lived the great middle-class of native born Americans in single family residences or apartments. Within this area, at strategic places, were local business centers, which Burgess implied might be likened to satellite CBDs. Zone V, the *commuter's zone* lay beyond the area of better residences, and consisted of a ring of encircling small cities, towns, and hamlets. These were, in the main, dormitory suburbs, with the men commuting to jobs in the CBD.

The operating mechanism of the concentric circle model was the growth and radial expansion of the city, with each zone having a tendency to expand outward into the next. Burgess assumed a city with a single center, a heterogeneous population, a mixed commercial and industrial base, as well as economic competition for the highly-valued, severely-limited central space. He explicitly recognized "distorting factors," such as site, situation, natural and artificial barriers, the survival of the earlier use of the district, and so on. But he argued that to the extent to which the spatial structure of a city is determined by radial expansion, the concentric zones of his model will apppear. Given the limited data available, the Burgess model was a remarkably astute description of the American city of the time.

A second model of the growth and spatial structure of American cities was formulated by Homer Hoyt in 1939 and is known as the wedge or sector theory.[3] Hoyt analyzed the distribution of residential neighborhoods of various qualities, as defined by rent levels, and found that they were neither distributed randomly nor in the form of concentric circles. High rental areas, for example, tended to be located in one or more pie-shaped sectors, and did not form a complete circle around the city. Intermediate rental areas normally were sectors adjacent to a high rent area. Further, different types of residential areas usually grew outward along distinct radii, and new growth on the arc of a given sector tended to take on the character of the initial growth in that sector. In summary, Hoyt argued that "if one sector of the city first develops as a high, medium, or low rental residential area, it will tend to retain that character for long distances as the sector is extended outward through the process of the city's growth."

Although no geometric pattern can be superimposed upon a city to determine the position of high and low rent sectors, some generalizations can be made about their location. The area occupied by the highest income families tends to be on high ground, or on a lake, river, or ocean shore, along the fastest existing transportation lines, and close to the country clubs or parks on the periphery. The low income families tend to live in sectors situated farthest from the high rent areas, and are normally located on the least desirable land alongside railroad, industrial, or commercial areas. Rental areas, are not static. Occupants of houses in the low rent categories tend to move out in bands from the center of the city, mainly by filtering into the houses left behind by the higher income groups, or in newly constructed shacks on the fringe of the city, usually in the extension of the low rent section. It is felt by some that because Hoyt's model takes

[3] Homer Hoyt, *The Structure and Growth of Residential Neighborhoods in American Cities* (Washington, D.C.: Federal Housing Administration, 1939). A suggestive fragment of this classic is reprinted in Mayer and Kohn, *op. cit.*, pp. 499-510.

into account both distance and direction from the center of the city, it is an improvement on the earlier Burgess effort.

A third model, the multiple nuclei, was formulated by Chauncy Harris and Edward Ullman in 1945 as a modification of the two previous models.[4] They argue that the land use pattern of a city does not grow from a single center, but around several distinct nuclei. In some cases these nuclei, elements around which growth takes place, have existed from the origin of the city, but others may develop during the growth of the city. Their numbers vary from city to city, but the larger the city the more numerous and specialized are the nuclei.

Urban nuclei attracting growth might include the original retail district, a port, a railroad station, a factory area, a beach, or, in today's city, an airport. The authors identify a number of districts that have developed around individual nuclei in most large American cities. The *central business district* usually includes, or is adjacent to the original retail area. The *wholesale and light manufacturing* district is normally located along railroad lines, adjacent to, but not surrounding the CBD. The *heavy industrial district* is near the present or former edge of the city, where large tracts of land and rail or water transportation are available. *Residential* districts of several classes are identified with high-class districts on desirable sites, on well drained, high land, and away from nuisances, such as noise, odors, smoke, and railroad lines, the low-class districts near factories and railroad districts. Finally, *suburbs* and *satellites*, either residential or industrial, are characteristic of American cities. Suburbs are defined as lying adjacent to the city, with satellites farther away with little daily commuting to the central city.

The rise of separate nuclei and differentiated districts is thought to result from a combination of four factors. 1. Certain activities require specialized facilities, i.e., a retail district needs intracity accessibility, a port requires a harbor. 2. Certain like activities group together because they profit from linkages. For example, retail activities may cluster to facilitate comparison shopping and financial institutions may locate in close clusters to make easy face to face communication by decision makers. 3. Certain unlike activities are detrimental to each other. Thus extensive users of land, such as bulk storage yards, are not compatable with retail functions, requiring dense pedestrian traffic. 4. Certain activities are unable to afford the high rents of the most desirable sites—low class housing is seldom built on view lots.

Models such as these which emerge from the process of analysis and generalization do not conform to the reality of any city. But anyone familiar with large or medium sized American cities will recognize many elements of each model in the vast majority of our urban areas. Obviously, too, they are not mutually exclusive, for the latter two models are both modifications of the concentric circle theory. Even in Hoyt's concept, residential areas expand outward concentrically. There has been extensive statistical testing of these models in recent years with no conclusive results. They remain as valuable conceptual tools for analyzing the modern city, and provide a basis for cross-cultural urban comparisons.

It is obvious, too, that the American city of the twenties and thirties, which provided the data upon which these models were built, is undergoing important structural changes. The traumatic

[4] Chauncy D. Harris and Edward L. Ullman, "The Nature of Cities," *Annals* of the American Academy of Political and Social Science, CCXLII (November 1945), 7-17. Reprinted in Mayer and Kohn, *op. cit.*, pp. 277-286.

effect of the automobile was not really apparent in the city studies that furnished the inspiration for these classic models. Other factors forming the basis for the urban form have been discussed previously, and some of their effects will be analyzed in the following section on the elements in the urban structure.

MAJOR ELEMENTS IN THE URBAN STRUCTURE

Central Business District

The most obvious and easy to recognize of the components in the spatial structure of American cities described by the classic models is the Central Business District. Generally located on or near the original site of the city, it became the focus of the city's mass transportation arteries, and was thus the point of most convenient access from all parts of the city. Here, in stylized juxtaposition, were found the largest department stores, women's dress shops, men's clothing stores, shoe stores, "five and ten cent" stores, jewelry stores, drug stores, and similar retail outlets. A visitor to an unfamiliar city could anticipate this arrangement, and when he found it he could also be confident that he had located the heart of the CBD as well as the area of highest land values and the place of heaviest pedestrian traffic.[5]

Other groupings of activities into specialized junctional areas have also been traditional in the CBD's of large cities. These may include financial districts, with banks, savings and loan associations, stock and commodity exchanges, brokerage offices, trust companies, and so on. The civic center with its city and county buildings often attracts lawyers' offices and bail bond agencies. Occasionally a theater district may be present, associated with restaurants and perhaps candy shops. Hotels and office buildings are usually found several blocks from the center of the CBD. Occasionally an office building may specialize in particular services, perhaps housing doctors, dentists, and medical laboratories exclusively, or in the height of specialization, it may house the officials of a single company. The extent of an office building area, though, depends upon the headquarters quality of the city and may cover a large area or be almost nonexistent.

Although absolute areal growth of the CBD may have essentially come to an end with the invention of the elevator and the skyscraper, this area, like the others in the city, is constantly changing. Shifts in its boundaries have been recognized by Murphy, Vance, and Epstein, identifying a "zone of discard" and a "zone of assimilation" associated with this movement.[6] The area from which the CBD is migrating, the "zone of discard" often is characterized by pawn shops, family clothing stores, bars, low grade restaurants, bus stations, cheap movies, credit jewelry, clothing, and furniture stores. The CBD tends to migrate in the direction of the best residences, and in the area into which it seems to be moving, the "zone of assimilation," are found speciality shops, automobile showrooms, drive-in banks, headquarters offices, professional offices, and the newer hotels.

Not only are the boundaries of the CBD changing, but due to the reduction of dependence on mass transit and the rise of the more flexible automobile, the last several decades have seen the move-

[5] A more extensive discussion of the CBD is found in Raymond E. Murphy, *The American City, An Urban Geography* (New York: McGraw-Hill Book Company, 1966), pp. 283-316.

[6] Raymond E. Murphy, J. E. Vance, Jr., and Bart J. Epstein, "Internal Structure of the CBD," *Economic Geography*, XXXI (January 1955), 21-46.

ment away from the CBD of some of its traditional functions. Department stores, once the exclusive possession of the CBD, have been built in large numbers in outlying areas. Other retail activities have followed their lead. The proportion of retail sales of the city credited to the CBD have gone steadily downward, and few new retail stores have been built here. A number of small and medium sized cities have attempted to reverse the declining retail importance of their CBDs by converting the main shopping street into a pedestrian mall. The success of this expedient is as yet unclear.

Many students of cities feel the CBD of the future will change considerably and perhaps will consist of two centers separated by a band of parking. The financial and office section in many large cities remains healthy, attracted to the focus of metropolitan transportation and the advantages of "linkages" with other office functions. As the traditional retail functions of the CBD decline, perhaps what remains will evolve into a separate center of dual services, comprising specialty shops serving the metropolitan area and mass selling stores supplying the needs of the inner part of the city.[7]

Outlying Commercial Centers

All cities, in addition to a CBD, have a variety of other commercial areas, and the larger the city the more complex the pattern and the more specialized some of the elements become. The largest of the outlying shopping centers, usually referred to as *regional centers*, are built around one or more department stores, with variety, apparel, and local convenience stores, and repeat in a planned or unplanned way, the retail types found in the very heart of the CBD. Usually these stores are smaller than the downtown counterparts and deal mainly in the staple and most profitable lines of merchandise. Early centers of this class grew at intersections of public transportation lines, but most have been built up recently at points of easy automobile access. Next in order of size are *community centers* with a large variety or junior department store, some apparel shops, plus a supermarket, drug store, bank, and similar establishments. The *neighborhood center*, built around a supermarket and with some associated stores, is an almost ubiquitious feature. Finally, *convenience centers*, perhaps consisting of a "pop and mom" grocery, a launderomat, and a service station, lie at the bottom end of the commercial hierarchy. Recently this hierarchy of commercial centers within cities has been compared to the centers of various orders in central place theory.[8]

Wholesaling and Light Manufacturing

Located in the concentric-circle model as a ring at the border of the CBD, the wholesale and light manufacturing activities have shifted considerably in response to newer forces. As the automobile has given mobility to the worker, many firms engaged in light manufacturing have moved away from the center of the city to the suburbs where land is inexpensive and large tracts facilitate one story plants, storage areas, and parking lots. Sites near belt highways are particularly desirable. Many wholesalers, too, have been attracted to similar locations.

On the other hand, certain types of wholesalers characteristic of large cities

[7] James E. Vance, Jr., "Emerging Patterns of Commercial Structures in American Cities," Proceedings of the IGU Symposium in Urban Geography Lund 1960, *Lund Studies in Geography*, Human Geography, ser. B. no. 24. Lund, 1962, pp. 485-518.

[8] A discussion of the hierarchy of commercial centers within cities is found in Brian J. L. Berry, *Geography of Market Centers and Retail Distribution* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1967), pp. 42-58.

are affected by forces that make clustering advantageous, often in or near the CBD. Clustering of wholesaling establishments normally persists when the buyers gather in person at the market, where the goods are nonstandardized, when comparison of quality or style is important, and when the establishment of the price is an important function of the market. Wholesalers of jewelry, apparel, fruit and vegetables, or cut flowers are characteristic examples.

Similarly, although most manufacturers have moved out of the central part of the city, a few characteristically remain. For example, large segments of the garment industry are found at the edge of the CBD in cities where it is an important manufacturing activity. One factor involved in this location is the close linkages of the manufacturing and wholesaling aspects of apparel production. But, in addition, clustering in the garment industry results in "external economies" (economies external to the firm). For example, the presence of ancillary firms, such as textile dealers, sponging (shrinking) facilities, factors (textile bankers), trucking firms, repairmen, and suppliers of everything from pretty models to thread, provides external economies to the apparel firms.

Heavy Manufacturing

Heavy industry has almost entirely moved out of the inner ring as postulated by Burgess, much of it into the specialized sites as implied by Harris and Ullman. Early located adjacent to water transport, the development of railroads and trucks permitted industries to leave the central areas. Seeking extensive sites for sprawling factories, parking lots, and storage facilities, large manufacturing complexes are now characteristically found in outlying locations. Some newer industries, such as the aircraft industry, are linked to facilities found only in noncentral areas, airports in this instance.

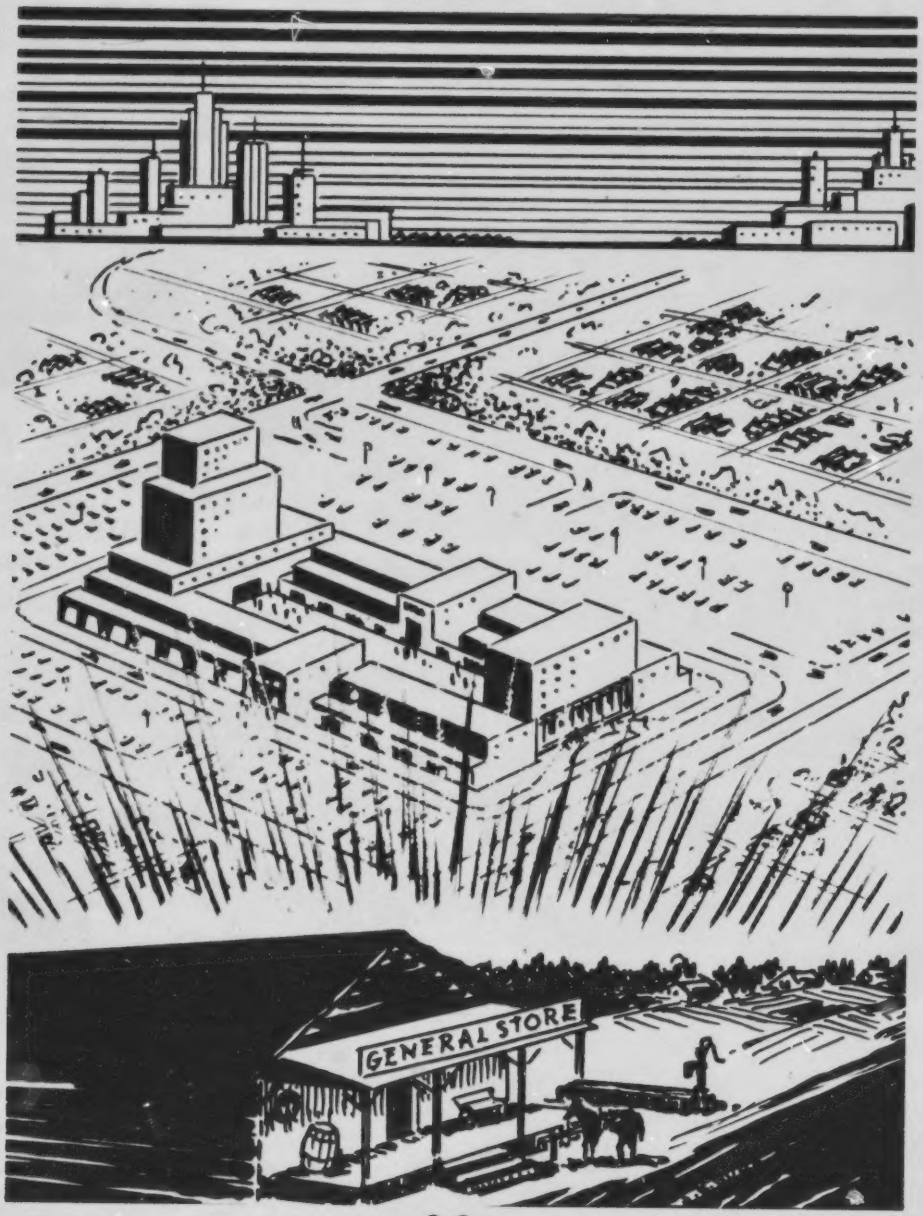
Residential Districts

Much has been said already about residential districts in American cities. Our heterogeneous urban population has shown a tendency to sort itself out one way or another into relatively homogeneous neighborhoods. As differences in language and ethnic character have become less important, segregation of residence has been mainly by economic status, with little mixing of the homes of the rich and the poor, as in some cultures. Race remains, however, as a segregating force, seemingly more powerful than economic status.

Another striking characteristic has been the propensity of the American urban dweller for the space consuming, expensive, single family dwelling. There is some indication that isolation and privacy are qualities of increasing importance. The front porch oriented to the street from which the family viewed the passing scene has disappeared from the post World War II house. Too, the room arrangement has been reversed: now the living room often faces the rear yard which has been designed as an addition to the living space. And in southern California, where life-styles often seem to originate, the backyard is now enclosed with a solid wooden fence or block wall, making the family's privacy complete. Continued spread of the traditional house in the middle of a lot (the now non-functional front yard remains, required by zoning ordinances reflecting an earlier era) forecasts continued suburban sprawl.

In contrast to this long term trend toward dispersal, in recent years, there has been a striking increase in the proportion of multiple housing in many cities. Per-

haps this is simply a temporary phenomenon reflecting the changing age composition of the population due to the low birth rate of the 1930's; the young and old often choose apartments, those in their thirties choose single family homes. To the extent, however, that this changing construction mix reflects a movement of those who can afford to live anywhere into more central, accessible locations, as urban distances become greater, it may foretell a weakening, at long last, of the American's traditional willingness to trade commuting time for space.



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LAND USE AND DENSITY PATTERNS OF THE METROPOLITAN AREA

Jerome D. Fellmann

The metropolitan area today is a study in contrasts. It represents a fusion of two different generations of urbanizing forces, each giving rise to distinctive patterns of land use arrangement and structural densities. The central city is the mass transit city, characterized by the channelization of traffic, focusing movement on central points, and by competiton between different uses for favored sites. The suburban fringe is the automobile city, influenced in its development by a more random movement of people and goods, emerging with only poorly developed focuses, and with an access to amounts of new urban land that reduced competition between alternate uses. Both "cities" were in part affected in their land use arrangements and densities by public control through zoning and subdivision ordinances. The purpose of this paper is to give a generalized analysis of the contrasting land use and density patterns of these two segments of the metropolitan area, to discuss some of the forces involved in their development, and to suggest some emerging trends.

THE CENTRAL CITY

Within the industrialized city of the mass transit era, created during the nineteenth and early twentieth centuries, distinctive and recurring land use patterns developed. That city may be characterized as being compact, showing a sharp division between urban and non-urban uses on its margins, and having high density and an irregular shape.

The key to compactness was the need to minimize walking distances—between home and factory or store, or between home and the nearest mass transit medium. Improvements in transit media during the nineteenth century permitted a great expansion in the area covered by the city. The coverage was continuous, for walking distance from the nearest mass transit line was the controlling factor affecting the utility of land for urban purposes. Even in railroad suburbs the same foot distance limitation between home and station demanded a compact form. Compactness, in its turn, implied a sharp division between urban and rural uses at the outskirts of the expanding community. Land beyond walking distance of the end of the mass transit line was valueless for urban purposes.

The contrast in land prices between land inside and outside the built up area (barring speculative holdings and occasional depres-

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sions) was sharp. Land usable for urban purposes was a scarce commodity. As any commodity in limited supply and of high value, urban land in the mass transit era had to yield maximum return in its utilization to justify its cost. It had, in other words, to be used intensively. High structural and population densities were the result.

Land values within the city were high, but not uniformly so. As a consequence, structural and population densities also varied. The attractiveness of parcels of land to prospective users, and the amount of competition between such users for possession of them determined their value, who ultimately occupied them, and, frequently, the densities at which they were utilized.

Attractiveness is, of course, a relative valuation among prospective users. It reflects the extent to which a given parcel does or does not satisfy the felt needs of the potential bidder. In some instances those needs are highly restrictive; in others, they represent desires rather than necessities. Physical geographic characteristics of parcels provide examples. Heavy industry and railroads are restricted in their selection of sites to low lying, level areas; where the terrain is irregular, their choices are limited. Upper income housing, on the other hand, has no comparable physical constraints, yet tends to gravitate to higher lying lands as a desire, not a necessity.

Strongly affecting the attractiveness of land was proximity to work. Even before mass transit, land close to the new mills and factories yielded profit, despite high costs, when covered by very high density (structural and population) worker tenements. Similarly, parcels near emerging business districts were attractive for rental housing for low income employees of the financial, commercial, and retail establishments of those areas. Today these frequently remain as high density slums although the original employment attraction is disappearing.

Differential accessibility also strongly affected the attractiveness of individual parcels and influenced the uses to which they were put and the densities they developed. As cities matured, high capacity transit lines were constructed radiating from a central point, usually the original settlement site. Such a nodal point, obviously, had maximum accessibility from all sections of the city. Here, under keen competition, the central business district became localized and the highest land prices and structural densities of the city emerged.

The routes themselves made attractive, because accessible, parcels within walking distance from them. While frontage lots might be usurped by commerce, close-by areas were generally given over to high density residential uses, with densities closely related to the carrying capacity of the medium. Again, areas at the terminal points of transit lines were more accessible than peripheral districts not so served and tended to grow outward with extension of the lines in the face of expanding rider demand. Unserved marginal districts were neglected in the growth process. In this way the irregular, finger-like outline of the expanding city was maintained and accentuated. This is the fourth of the central city characteristics mentioned previously.

The undeveloped areas removed from the radiating high capacity mass transit lines were eventually filled in as demand for urban land increased. A lower capacity transit network penetrated them as feeder lines to the high capacity systems. Their reduced accessibility (frictions of time, distance, transfers) reduced their value and they became part of a spreading lower density, later generation residential land use pattern.

Gradually, the land use and density differentials of the generalized mass transit central city take form. To land economists and economic geographers, particularly, both the recurring general patterns and distinctive local variants are the result of the market process. Each parcel is individually evaluated by alternate users from the standpoint of the potential return (economic, aesthetic, etc.) each user can expect. Under a continuing auction system the parcel is awarded, presumably, to the highest bidder. Exceptions are made through public reservation from the market of parcels devoted to public and institutional uses.

Although land use patterns of the city are assumed to be subject to constant change with changing use–value estimations, in reality inertia, investment in structures, and other causes create maladjustments. The plight of the central cities today is, to a degree, a reflection of an excessive accumulation of those maladjustments.

Standard urban growth theories are also full or partial theories of land use arrangements.

All, despite their underlying differences, obviously describe recurring land use and developmental patterns appearing in some form in central cities maturing during the mass transit era.[1]

Burgess proposed an idealized land use pattern in which the city is composed of five concentric zones or circles. The inner zone is the central business district. It, successively, is surrounded by: a zone of transition in which are deteriorating housing (slums), light manufacturing, wholesaling, and the like; a zone of working men's homes; a zone of better residences; and, finally, a commuter's zone. In a growing city, each zone continually expands outward, invading the next outer circle; zone five pushes into non-urban land.

A "sector" theory proposed by Homer Hoyt deals only with residential land uses. It observes that such uses radiate from the city center in sectors (or wedges) arranged along transportation routes. The pattern is dominated by high rent areas located in one or more sectors, with a downward gradation of rentals in all directions from those sectors. In growing cities, high rent sectors continue outward extension; their abandoned inner sections become medium quality, and the original medium quality wedges may become low rent in character.

Harris and Ullman propose a multiple nuclei pattern of city structure in which land uses are arranged around not just a single city center but around other nodal points as well. The land use pattern of the city, therefore, can be understood from the standpoint of the prior existence or subsequent development of specialized land use concentrations which expand until they come in contact with adjacent expanding nuclei.

Whatever the theoretical generalizations or individual observations of the urban land use pattern may be, it is obvious that that pattern is not one of indiscriminate intermixture of uses. Rather, distinct use districts are recognizable within the central city. Distinctive elements in the land use structure are the transportation framework and commercial, industrial, and residential uses.

Land devoted to routeways is of extreme importance in the structure of the community. The street system, penetrating every section of the city and all use districts, provides the framework for the total city pattern. Its adequacy of design and sufficiency of capacity are determining factors in individual location decisions and in the efficiency with which use districts within the city are interconnected. Bartholomew[2] reports that within fifty-three central cities an average of twenty-eight percent of developed area is occupied by streets, a figure that is constantly growing through the addition of expressways. The former importance of the mass transit systems in shaping earlier growth patterns, use district arrangements, and density characteristics has already been noted. Railroads, making up on average about five percent of developed area, are important as localizers of both lineal and nucleated industrial districts and, through the barrier-like nature of their embankments, as distorters of surface traffic flow and as dividers of the city structure.

Commercial areas, averaging three to four percent of the developed land of central cities, are of importance disproportionate to their size, serving as they do as generators of traffic, of employment, and of income. Commercial land is localized within the city by the twin controls of distribution of purchasing power (that is, distribution and density of population) and by accessibility (originally by mass transit). In general, commercial land in central cities is characterized by high structural densities and by a hierarchical ordering (large concentrations ranging down to isolated neighborhood stores).

Murphy[3] suggests that commercial areas consist of two basic forms: nucleated and lineal. At the apex of the hierarchy, and the largest and most complex of the nucleations, is the central business district, localized by converging transit lines. Itself a complex of contained land use districts (mass buying, quality buying, financial and administrative, etc.), the central business district has the highest structural densities resting on the highest valued land of the metropolitan area. With lesser degrees of centrality, and localized frequently by

[1] Diagrams of these theoretical structures may be found in Raymond E. Murphy, *The American City* (New York: McGraw-Hill, 1966), Chap. 12.

[2] Harland Bartholomew, *Land Uses in American Cities* (Cambridge, Mass.: Harvard University Press, 1955), Table 3.

[3] *op. cit.*, p. 263.

transit transfer points, are major outlying business districts. Isolated store clusters, central to the neighborhood market area, are low level examples of nucleation. As the name implies, lineal developments line business streets, frequently designated for this purpose by zoning ordinances.

Industrial land, on average, occupies between six and seven percent of city area, though wide fluctuations occur. In form, industrial uses are lineal, clustered, and scattered. The first two forms are frequently associated with heavy industry, the latter with light. Alignment is generally transport related, representing the attraction of railroads, rivers, or waterfronts. Clustering may also represent transport forces, as at crossings of railroads; in other instances clusters may be planned or induced by zoning ordinances. Light industry frequently rings the central business district and is scattered through the residential areas. Other orientations of industrial land are to topography (level) and to access by workers (mass transit). In light manufacturing and fabricating, older industrial areas display high structural densities with multi-story plants covering essentially the entire parcel. Heavy industry, with its needs for storage areas, frequently shows much lower density figures.

Occupying between thirty and forty percent of the average city's area, residences are the most extensive of urban land uses. Varying density patterns and their controls and standard theories of land use emphasizing the residential have already been discussed, but a few additional generalizations may be in order. Single family structures dominate areally, covering on the average eighty percent of residential land,[4] although the amount used by multi-family structures tends to increase with increasing population size of the city. Apartments or tenements tend to be found on the fringes of the central business district and along superior traffic or transit lines. In the remaining residential areas higher densities are associated with the older sections developed when land was a relatively scarce commodity; lowest densities are found in the outer areas where remoteness reduced the price of land and where subdivision ordinances began to demand greater spacing between houses.

[4] Bartholomew, *op. cit.*, p. 46.

Many of these land use and density patterns, and the controls which gave rise to them, are not part of the structure of newer central cities which reached maturity during the automobile period of the twentieth century. In those, other controls were operative and other forms and patterns developed.

THE SUBURBAN FRINGE

These new controls and the patterns of land use and density which they induce are particularly evident in the suburban portions of the metropolitan complex. Though part of that suburban zone houses older compact railroad suburbs, the vast majority of it has developed since World War II. This "automobile city" shows striking contrasts to the mass transit city to which it is spatially and functionally oriented.

The automobile broke the shackle of walking distances and opened up vast new territories for urban development beyond the limits of the mass transit systems. Land was converted from a scarce, high cost resource to a plentiful, low cost one, and one that could be used much more extensively. With automobile mobility, no longer was a compact urban structure with rigid separation or urban and rural uses required. The result is obvious and visible.

The suburban area is characterized by low population and structural densities—extremely low by standards of the oldest portions of the central city. One hundred years ago, a growth of one thousand in the population of a city meant only about a ten acre addition to the total urban area. Such an increase at the present time means an addition of one hundred acres or more. Other characteristics of the suburban automobile city are an intermingling of urban and non-urban uses and a non-focused structure, quite unlike that of the central city, resulting from the nearly random individual movement made possible by personal automobiles and by trucks. To a large degree these characteristics developed spontaneously, without public control in the form of zoning or subdivision ordinances. Although such controls have recently become more common, the patterns they might have directed had already taken form.

The extensive low density discontinuous residential areas of the fringe, largely single family, were the first evidence of the automobile city. Other land uses soon followed. Commer-

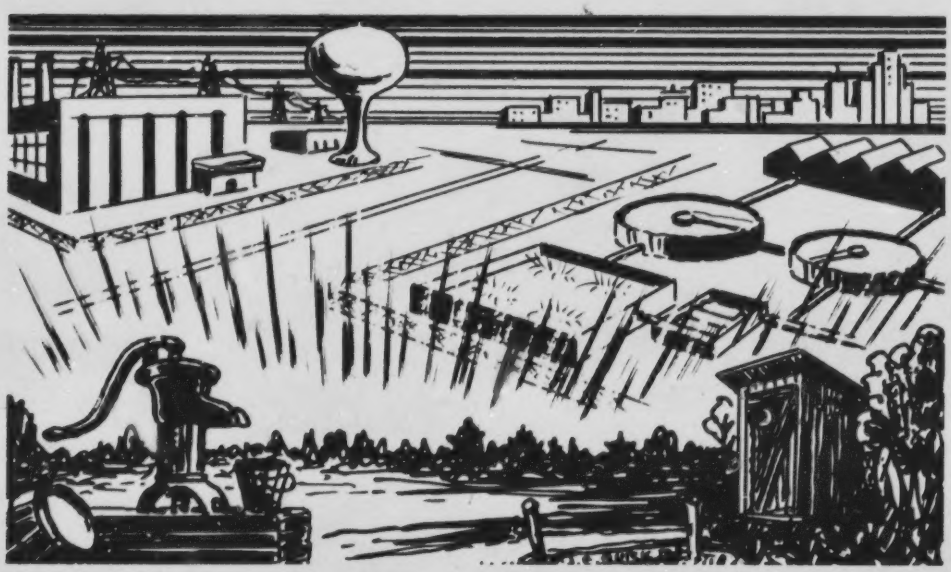
cial activity was attracted by the purchasing power of the fringe area. The nucleated shopping center emerged. Tied to the automobile, not mass transit, it has a greater range of locational choice than before and a requirement for parking areas that greatly reduces traditional commercial densities.

Industrial land, too, has become part of the fringe area reflecting a quest for cheap land for new single-story plants and the necessary areas for parking, off-street loading, and landscaping. Again, older patterns of density are altered in the new fringe city. Instead of one hundred percent land coverage by multi-story plants as in the central city, as much as a 10 or 20 to 1 ratio between needed building space and demanded land area is standard on the fringe. Patterns of nucleation, alignment, and scatter still remain, but now the nucleation is in low density industrial parks, the alignment related to the frontage road of the expressway, not the railroad, and the scatter not in the heart of residential areas but in isolated plant sites.

Within the automobile city, unlike the central city, there is no regularly arranged, closely knit continuous network of streets to form the framework upon which the fringe area develops. Rather, initially at least, individual roadways connected isolated, independently conceived street systems of separate suburban communities. Those systems, in their turn, involve modern concepts of superblocks and curvilinear streets with a correspondingly lower proportion of developed land in the street system than is the case in the mass transit city. More recently, filling in of unoccupied land by new development has begun to connect individual systems, but has not endowed them with a pattern of regularity.

TRENDS

Despite the noted contrasts in land use patterns and densities between the mass transit and automobile segments of the metropolitan area, elements of similarity are beginning to emerge. Frictions of distance and travel time are slowing the spread of the fringe, while continuing demand for land is filling up at least the inner suburban zone. As in the central city, a pattern of continuous rather than discontinuous urbanization is developing, though at substantially lower structural densities. That demand is also reflected in higher land values inhibiting single family residential construction and encouraging the rapid spread of garden apartment developments. Redevelopment programs in central cities, while obviously not converting them into suburban equivalents, are at least breaking the continuous structural cover of former periods with a new, more open generation of uses. At the same time, the expanding system of expressways is tying the two cities into closer physical unity.



THE ORIGIN AND PATTERN OF DEVELOPMENT OF URBAN BLACK SOCIAL AREAS

Harold M. Rose

The urban geography of the city has historically focused on the city as a physical entity. But, as the city has evolved into an arena of complex social interaction and has increasingly become the locus of a host of ill defined social and economic problems, geographers are beginning to view it from a different perspective. The title of Churchill's book, *The City Is The People*, is a good description of that new perspective. While many characteristics of the residents of the American city help to mold its character and affect its image, none are currently so important as race. Most major American cities are rapidly becoming the place of residence of the black population, as the white population continues to abandon the city for the open space of the suburbs. Thus, within one generation, the racial spatial patterns prevailing in large American cities have undergone very profound changes. In order to better understand the nature of the most recent social conflict that has evolved within the metropolitan complex, some understanding of the nature of existing racial spatial patterns will be helpful.

The evolution of social groups in urban space with an attachment to a territorial base has been a common phenomenon in American society. The classic example is associated with the rise of territorially-based ethnic communities in eastern and midwestern cities during the late nineteenth century. Ethnic enclaves often occupied the least desirable parts of the city, but performed the function of providing a sense of community at a crucial stage in the life of its residents. Most of the old ethnic enclaves have disappeared or now occupy only remnants of their previous domain.

The previous territorially-based social groups have been succeeded by the recent rise in the magnitude of urban black populations.

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At the present, these new territorially-based social communities are rapidly growing entities which show no sign of diminishing. Communities of this type are often described as black ghettos. Thus, the geography of black urban populations most frequently coincides with the geography of the ghetto.

THE EVOLUTION OF THE GHETTO

The black ghetto, as an urban spatial form, is not new to major American cities, as there is historical evidence which attests to its presence as long ago as the early nineteenth century.[1] What has changed is the areal magnitude of the ghetto community and the social philosophy bearing upon its existence. The term *ghetto* has grown in popularity during the past two decades to describe those parts of large urban centers which are predominately occupied by the black population. The appropriateness of the term has, on occasion, been challenged by those from both without and within who are offended by its implications.[2] Since the term tends to imply spatial restriction only indirectly related to housing costs and more directly related to race, one might logically expect this kind of reaction.

The black ghetto represents a social area or community occupied chiefly by persons of a single race and somewhat similar subcultural characteristics. The presence of the ghetto has led to social isolation and a strengthening of subcultural characteristics. A new generation of blacks is today attempting to capitalize on what was previously considered an undesirable situation by emphasizing the positive aspects of the subcultural differences which have evolved and spread within these social areas.

For the geographer, who is accustomed to delimiting areas on maps, the above definition does not ease his task. First, because of its failure to specify the intensity of black occupance necessary to qualify an area for membership in this social area, and second, because of rapid scale changes occurring within the ghetto community. Furthermore, there are regional differences which impinge upon a complex set of forces which ultimately lead to ghetto formation. To be more specific, it is generally agreed that the forces at work in the South are somewhat different from those which operate outside this region. Ultimately though, even though the ghetto forming process is variable, the same type of conceptual spatial form has evolved throughout the nation.

Black social areas which have come into existence in major northern urban communities might be described as type A, while those developing in the South might be thought of as type B ghetto areas. In the latter region land was initially set aside to be employed as housing sites for the black population. The type A ghetto is the result of one population replacing another in a common housing market, principally along racial lines. More recently the expansion of type B ghettos has followed a pattern similar to that which is characteristic of the North and West. The forces, which once permitted regional differences in the pattern of ghetto formation, appear to be weakening, as the ghetto formation process in the South more and more is beginning to resemble that prevailing outside the region.

In order for the geographer to translate a social concept into a valid spatial configuration, a decision has to be made regarding the minimal level of black occupance necessary for an area to become identified as a segment of the black ghetto. Not only is the intensity of occupance a prerequisite for establishing the areal extent of the ghetto, one must also agree on a suitable unit of occupance on which these measurements will be based. The most suitable unit for mapping purposes is the block concept employed by the Bureau of the Census, which is a cellular rather than linear block. This enables one to point out differences in intensity of occupance within short distances and is, therefore, a more sensitive measure of the spatial form of the ghetto at any given time. The question of the more appropriate minimum level of occupance for establishing the spatial limits of the ghetto is a difficult one and should be given careful consideration.

A more rational approach to the solution of this problem can be specified for type A ghettos than for type B. In the case of the former, there seems to be more evidence available which describes the expected behavior in a common housing market. Whites frequently refuse to compete with blacks in racial housing

[1] Gilbert Osofsky, "The Enduring Ghetto," *The Journal of American History*, September 1968, p. 244.

[2] Karl R. Rasmussen, "The Multi-Ordered Urban Area: A Ghetto," *Phylon*, Fall 1968, pp. 283-290.

markets where blacks are in the majority. Since one's perception of what constitutes the majority is often impaired, it appears that some smaller value, that is, less than 50 percent, would represent a more appropriate minimum. With this in mind, blocks containing a minimum of 40 percent black household heads were designated for ghetto inclusion. Thus, the spatial form of type A ghettos might be described by including all contiguous blocks possessing a minimum of 40 percent black occupance. The problem of establishing limits for B type ghettos is even more problematic.

The employment of the above specified level of black occupance as the outer limit of the ghetto, as a spatial configuration, implies much about the evolution of a territory as a social area. Black institutions will be principally confined to the core of the ghetto where the level of intensity of black occupance is higher and a threshold population has been present for a much longer period of time. Along the margin of the ghetto edge, white social and selective economic institutions will be beginning to disappear. Frequently, in type A ghettos, the black population inherits a set of institutional structures which were developed by and for the previous residential population.

The boundary separating the black community from its neighbor is in a constant state of flux. A zone of transition of varying width tends to separate these social communities. In type A ghetto areas the zone of transition will include blocks with a level of black occupance ranging from twenty percent to less than forty percent. Within this zone, many residents exhibit a feeling of not holding membership in the zone of occupance. The boundary in type B ghettos are generally more abrupt than those characterizing the type A communities and in some there is almost a complete absence of the zone of transition.

THE PERSISTENCE OF THE GHETTO

The ghetto or black social areas in urban space are not threatened by the imminent possibility of disappearance. The areal magnitude of the ghetto is one of continuous expansion.[3] One might point out that two most rapidly expanding spatial configurations in the metropolitan complex are the ghetto and the suburbs. While there are shifts in ghetto land use as an outgrowth of competition with other urban land users, this simply results in the more rapid inclusion of contiguous space as a part of the ghetto configuration. The contiguous black occupance of vast areas of urban space within our major metropolitan complexes works against any meaningful change in the pattern of development of social areas based on race. While social areas evolve that are racially based, these areas are not homogeneous. There exists within the ghetto community a spatial stratification based on income differences.[4] Black social areas possess a kind of internal structure which is a replica of that which prevails in the larger urban community. The strength of stratification, though, is weaker than that which exists outside, and thereby leads to a great degree of social and economic heterogeneity.[5]

When one considers the persistence of this urban form, one wonders why geographers have given it so little attention. This, no doubt, is a reflection of the recency of recognition granted to the sub-field of social geography; an area which is not yet highly developed in the United States. The continued existence of black social areas largely rests on the future of race relations. A combination of white backlash attitudes and the rise of the concept of black awareness prolongs still further the continued existence of social areas that are racially based. These social areas tend to evolve into cultural areas and thereby reflect the areal consequences of cultural pluralism.

The non-diminishing character of black social areas could play a major role in the alteration of the structure of urban governments. As more and more major urban centers become the place of residence of black populations spatially dispersed in the previously described manner, the possibility of black political controls appears ever more likely. If traditional white behavior can be anticipated, there could be a widespread opting for a metropolitan form of government. If this does happen, one

[3] Theodore G. Clemence, "Residential Segregation in the Mid-Sixties," *Demography*, IV, 2 (1967), 562-568.

[4] Karl E. Taeuber, "The Problem of Residential Segregation," *Proceedings, The Academy of Political Science*, XXIX (1968), 108-109.

[5] James Q. Wilson, "The Urban Unease: Community vs. City," *The Public Interest*, No. 12, Summer 1968, pp. 33-34.

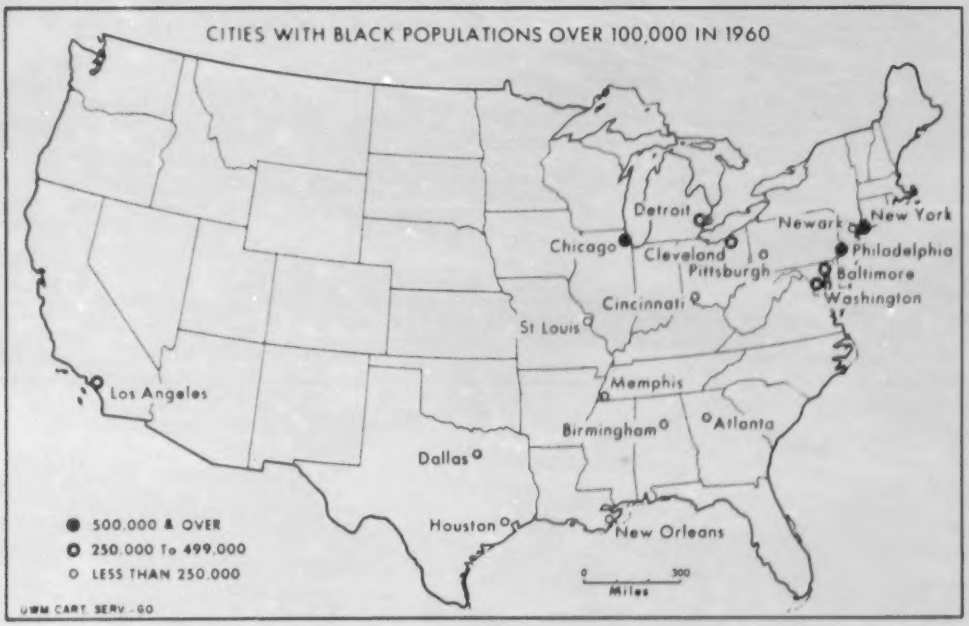


FIGURE 1

can attribute to the black ghetto the power to promote the development of a governmental form that has previously engendered only minor support.

THE GHETTO PATTERN

The pattern of ghetto development might be viewed in terms of its historical pattern of evolution and thereby emphasize the growth of black communities as a response to changes in the social and economic conditions in the larger community. The ghetto pattern viewed from this perspective would focus on the distribution of urban areas containing black communities having reached some predefined order of magnitude. Thus, if one was concerned with identifying the location of black communities in the United States on the basis of population size, then a map of such localities could easily be constructed.

In 1960, one-third of the nation's black population resided in eighteen cities.[6] Each of these cities contained more than 100,000 Negroes in their populations. (Figure 1) At the same time, approximately two-thirds of the nation's black population were residents of metropolitan areas. The size of the black community is highly correlated with the size of the total population among the ten ranking black communities. There are some slight differences in rank among the ten largest communities and the ten largest black communities.

Regional differences in the distribution of the nation's major black communities are also apparent. As is true of the nation's population as a whole, the Middle Atlantic and North Central cities are the locations of most of the large black communities. The South includes four of the eight second-order ghettos, but only two among the ten ranking black communities. The West, the most recently developed urban region in the nation, contains only one of the major black communities, and it is to be found in Los Angeles. The prevailing regional pattern reflects accessibility between the original source region, and that of the chosen destination. The pattern of black migration developing after the turn of the century has largely influenced the magnitude of the population prevailing within these communities.

An alternative way of viewing the external pattern of black communities might be to de-

[6] *The Negroes in the United States, Their Economic and Social Situation*, United States Department of Labor, Bulletin No. 1511, June 1966, p. 19.

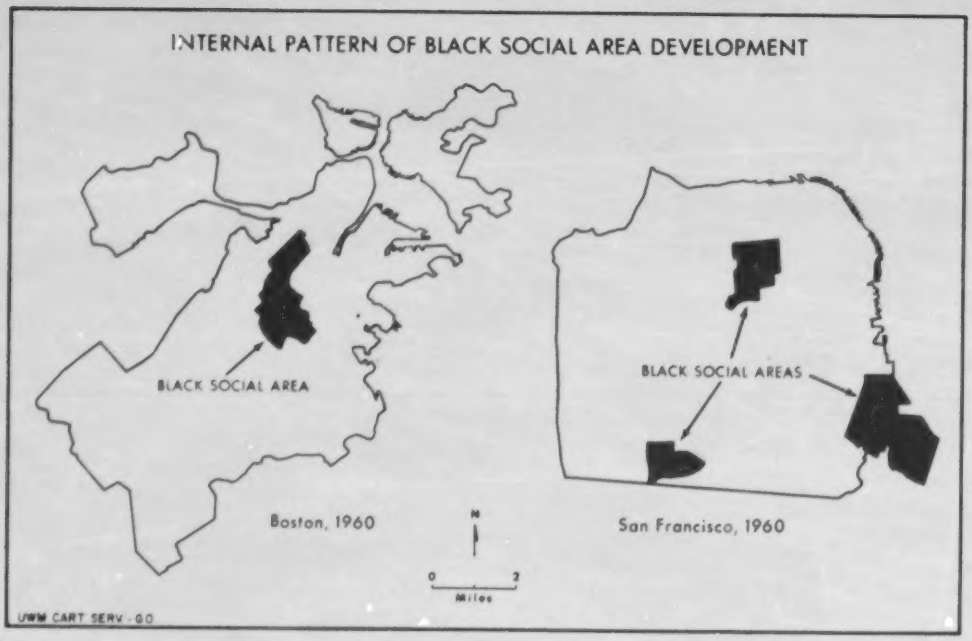


FIGURE 2

velop a map showing the racial imbalance in cities of more than 100,000. In this case one might employ as an index of imbalance a ratio that is, minimally, twice the national percentage of blacks in the total population. Such a distribution would include those places in which the Negro percentage is twenty-two percent and above. Employing an index of this type, such enormous communities as New York and Los Angeles would be eliminated from the list of major black communities. The greatest imbalance occurs in southern cities and major industrial centers in the Middle West. The newer cities of the southwest and west almost all contain a ratio of a lower order of magnitude. While such an index is instructive, it does not appear to be a suitable surrogate for the former, and furthermore, regional indexes of imbalance might be of greater validity than a single national index.

The kind of point pattern described above does not actually describe the spatial pattern of the ghetto, but the pattern of distribution of communities which have nested within them ranking ghetto communities. The internal pattern of ghetto development is highly varied and tends to run the range from a single major cluster to several minor clusters. The spatial pattern of ghetto clusters is related to such factors as: 1) heterogeneity of housing costs in contiguous space; 2) pattern of employment; 3) stage of ghetto development; 4) the size of the black population; and 5) public policy. Many of the embryonic ghetto communities in major cities are characterized by a single cluster, but even this is not a universal pattern. (Figure 2) Minneapolis, with one of the smaller black communities among major urban centers, has at least two distinctive black population clusters, while Denver and Seattle, whose black communities in 1960 contained fewer than 50,000, were the sites of essentially a single ghetto cluster. Smaller ghettos have developed on the fringes of the metropolitan area in some instances. These have sometimes been described as *ghettolets*. The fringe enclaves run the gamut in terms of their economic and social structure. No single generalization can be made at this time which would explain the pattern of ghetto distribution within central cities.

THE GHETTO CONDITION

The most common image of the ghetto which is held by the public is that of a slum or blighted zone. All too often the public image is not far off the mark. Nevertheless, the ghetto concept is not a substitute for zones of crum-

bling residential structures. It is true that the residential quality within those areas identified as elements of the black ghetto is constantly deteriorating because of age and the limited development of new residential structures. (Figure 3) It is likewise true that within segments of the ghetto or within individual ghetto clusters housing quality is high, and the visual appearance of these areas does not differ perceptibly from that of adjacent areas. (Figure 4) Unfortunately, the latter condition seldom constitutes the model condition of housing located within the ghetto context. A point to be made here is that the physical condition of the ghetto is in no way involved in establishing its territorial limits.

FIGURE 3

The above photography depicts the age and structural characteristics of a set of housing units located in a segment of an older black social area in Minneapolis, Minnesota.

If quality of the ghetto environment is measured in terms of some index of residential quality, then one would have to accept as a truism that environmental quality is low. The low quality of the residential environment is generally associated with the fact that the ghetto, in its incipient state, is confined to zones of the oldest housing in the city. In type A ghettos, this housing is most often found nearest the city center, yet, in some of the B type ghetto clusters, alternative patterns sometimes emerge. In the latter situation, where basic shelter was often provided for segments of the black labor force, vacant land and accessibility to the job were major considerations; a situation which could easily lead to a pattern of ghetto development unlike the modal type evolving within type A ghetto areas.

As the ghetto expands from its interior location outward, it frequently will include the

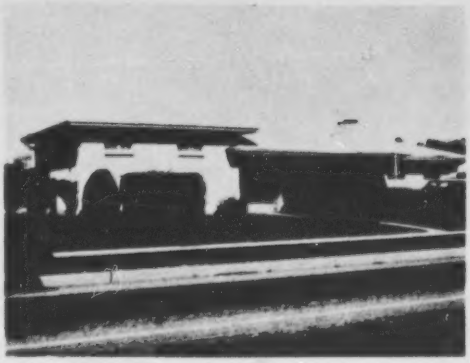


FIGURE 4

The housing unit displayed here is in many ways indicative of the age of the city and the nature of the housing being inherited by blacks within the city proper. Many housing units of this type and age can be found in incipient black social areas in Denver, Colorado.

range of housing quality that is to be found within a single sector of the city. This range is clearly typified in the southern sector of black occupance in Chicago. The physical enormity of the area makes possible a wide range of housing quality. A second alternative is represented by the Boston ghetto. In this case, the age of the central city and the nature of the housing developed within the central city during the most recent building cycle, coupled with the size of Boston's black population, relegates it to a zone of little differentiation. The impact of age of the city and the size of the black population can also be seen in some of the newer western cities. The black ghetto in Denver, as a case in point, hardly resembles that of Boston in terms of residential quality. This younger city, with its prevalence of relatively new single family structures located in the path of ghetto expansion, is sometimes held up as a model black community, in terms of its physical quality.

Poverty in the black ghetto is all too commonplace and does much to help reinforce the existence of the ghetto, but is not the basic factor explaining its existence. The National Commission on Urban Problems recently revealed their findings on the areal extent of poverty, occurring within the nation's principal urban agglomerations. While the percentage of the total land area occupied by persons in poverty is highly variable, the percentage of black occupants situated within poverty areas is consis-

tently high.[7] Blight is likewise an ever-present condition within poverty areas. An extreme example is represented by Birmingham, Alabama, wherein 45 percent of the total land area of that city can be described as representing a landscape of poverty. More than 90 percent of the occupants of the poverty area in Birmingham are black. McHarg's modification of a once proud national proclamation seems to be an altogether fitting description of today's urban condition: "Give us your poor and oppressed, and we will give them Harlem and the Lower East Side, Bedford-Stuyvesant, the South Side of Chicago, and the North of Philadelphia—or if they are very lucky, Levittown."[8]

The physical quality of life in social areas described as black ghettos is far from heartening in most instances. Yet there are examples of segments of urban space that have had attached to them the ghetto label that are on par with many non-ghetto areas. Needless to say, the former type of ghetto condition is that whose image is most widespread and to which more effective attention must be focused as a means of altering the quality of the environment.

CONCLUSIONS

The long range future of urban black social areas is highly speculative. Although there is little evidence which would lead one to believe that they are anything less than semi-permanent features in the urban landscape. The momentum associated with ghetto development in the nation's principal metropolitan complexes works against any short run reversal of the process. Thus, black social areas are likely to become increasingly territorially-based at a time when territorially-based social communities are diminishing in importance. One noted urbanist recently remarked that "Here in the slum blocks of the central cities may be the only pure place-based social neighborhoods we have left."[9] If this is the case, one can only expect a widening of the rift that has led to the social ferment in the cities.

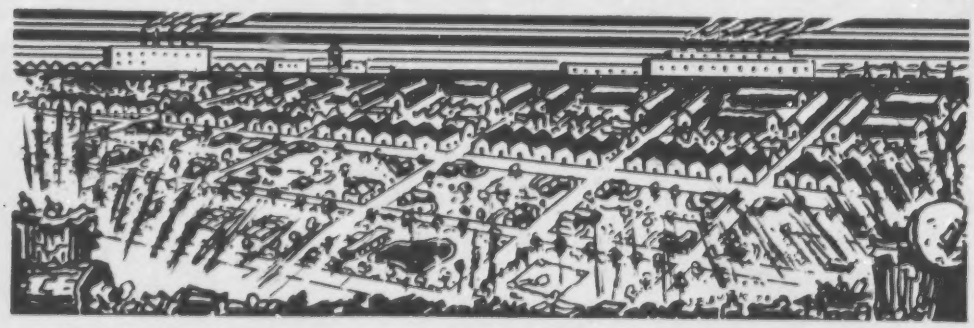
Moves currently afoot could lead to the eventual invalidation of the employment of terms such as ghetto to describe black social areas. But, until these areas are perceived differently both by their residents and outsiders, the ghetto designation tends not to be inappropriate. At the present there is some evidence that internal perceptions are being altered more rapidly than the external ones. To the contrary, there has been a sharp upsurge in the usage of the ghetto designation by the popular media in referring to spatially-based black social areas.

While black social areas are not threatened by the immediate prospect of disappearance, there exists the possibility of an alteration in the pattern of social area development. In the future it is conjectured that a larger number of small black clusters dispersed throughout the metropolitan complex could represent the modal pattern. Such a pattern could lead to improvements in the quality of the environment in black social areas. Needless to say, because of the diminution of the perceived power base associated with expansive territorial control, the latter pattern might be rejected by blacks.

[7] Allen D. Manvel, *Housing Conditions in Urban Poverty Areas*, The National Commission on Urban Problems, Research Report No. 9, 1968, pp. 14-19.

[8] Ian L. McHarg, "Values, Process and Form," *The Fitness of Man's Environment*, Washington, D.C., 1968, p. 211.

[9] Melvin M. Webber, "The Post-City Age," *Daedalus*, Fall 1968, p. 1102.



CITIES:

Transportation and Internal Circulation

Harold M. Mayer

Without transportation, cities could not exist. The functions of cities depend upon receiving labor, fuels, raw materials, and components, and upon reaching the markets for the goods and services which cities provide.[1] Cities, furthermore, are centers of communication and innovation, from which diffusion of information, ideas, and inventions take place.[2] Spatial interaction consists of the movement of people, goods, and ideas; the study and interpretation of movements of people and goods and of the facilities for effectuation of such movements constitutes the geography of transportation, a sub-field of both urban and economic geography, while the transmission and diffusion of ideas and information constitutes a closely related field, that of the geography of communication.[3] The reason for spatial interaction is the fact that resources, including people, do not usually occur at the places where they are utilized. They must be transported or, in the case of ideas, transmitted to the point of utilization. Each city and each region produces certain specialized goods and services, which exceed the local requirements. These are exchanged for others in which the production in the region is deficient in accordance with the Law of Comparative Advantage. This law states that each region ideally, should produce, subject to man-made constraints, such as tariffs, nonconvertability of currency, and quotas, goods and services as can be produced at a relative advantage.[4] Cities may be regarded as nodes in networks of transportation and communication, with highly concentrated sets of spatial interactions.[5] Concentrations of economic activity, therefore, generate movements, the totality of which is called *traffic*. Without traffic and the facilities for handling it, the specialized development of regions, including cities which constitute a form of nodal region,[6] could not take place.

Similarly, activities within cities take place in "establishments" at specialized locations. Innumerable linkages exist among the individual establishments and clusters of establishments within urban areas. Transportation, therefore, is a major variable affecting the internal land-use and functional patterns of cities, constituting a major element in the structure of urban areas.[7]

Transportation and Land Values

Urban land, unlike rural land, derives its value almost entirely from its location relative to other land with which it has actual or potential interaction. Rarely are the inherent characteristics of the site, such as soil fertility, of particular relevance to urban land values, al-

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though often adverse conditions, such as susceptibility to floods, landslides, and other adverse natural phenomena may lower values, whereas advantageous sites, such as waterfronts and scenic views, may tend to increase values. Urban land, rather, derives its value from its future utility for the siting of urban functions. Since these functions depend upon accessibility to each other, the value and use of urban land, and hence the physical and functional patterns of the cities, depend upon the relative availability and spatial patterns of transportation within, as well as to and from, the urban areas.[8] Transportation represents a cost of overcoming the friction of space, or distance, in order to compensate for lack of mutual proximity among interacting establishments and land uses. By providing access it somewhat compensates, in terms of greater potential use and hence higher land values than would otherwise be the case, for increased distance and lesser proximity. The higher the intensity of use (mutual proximity), the greater the land values and the lesser the transporation costs—aside from the costs of congestion, which places a limit upon density of development—and, conversely, the lower the density, the lower the land costs, unless there are prospects of substantially increased density. Thus, transportation facilities increase access, and hence land values, although it may be argued that there may be an upper limit to total interaction and hence provision of transportation may ultimately represent a shifting of values among sites as much as an increase in total land values within a metropolitan region. These principles were long recognized by land economists and urban geographers.

Two generations ago, Hurd pointed out the relationships between extensions of the urban transportation routes and the shaping of the city pattern,[9] and later Colby, in his classic paper, demonstrated that locational choices within urban areas are the resultant of two vectors, centripetal or centralizing forces, and centrifugal or decentralizing.[10] The convergence of transportation routes at and near the urban center represents the former. The divergence of routes, making peripheral land accessible, represents the latter. Thus transportation may be both centralizing and decentralizing at the same time. These concepts, dating back to Von Thünen in the early nineteenth century, are also the basis of the three well-known classical models of urban growth and structure: the concentric zonal model,[11] the wedge or sector model,[12] and the multiple nucleii model.[13] All of these models involve a negative exponential curve of densities and land values, generally observed in most cities, in which density of development, land values, and traffic generation all decrease at a rate away from the points of maximum accessibility and concentration. Improvements in transportation, by spreading accessibility over wider areas, spread development potentials and hence land values, while at the same time they intensify central concentration and development of other nucleii within the metropolitan areas by concentrating access at a limited number of nodes.

Transportation as a User of Land

Transportation not only makes urban land accessible, but it is itself responsible for directly using a high proportion of the land in urban areas, ranking, in most cities, second only to residential use among the major categories of land-consuming activities. A study of 53 cities showed that public streets and alleys occupy from one-fourth to one-third of the developed area and from eleven to twenty percent of the total area of the cities, while railroad property occupies approximately five percent of the developed area and nearly three percent of the total area of the incorporated cities, with the highest proportion within the largest cities.[14] A more recent study of 48 cities showed approximately the same proportion of urban land devoted to streets, averaging, for the cities studied, 25.7 percent of the developed area and 19.9 percent of the total city area.[15] Finally, a study of land uses in 106 of the 130 American cities which had a population of at least 100,000 in 1960 showed that public streets occupied 17.5 percent of all land area in cities of over 100,000, and 18.3 percent of all land area in cities of 250,000 or more, with a range of from 9.6 percent in Phoenix, Arizona and Beaumont, Texas to 30.1 percent in New York City.[16] These figures exclude the areas used for off-street parking and for truck terminals, as well as that devoted to other transportational uses, including railroad facilities, airports, and port terminals. Because transportation maximizes access at a limited number of nodal locations, it demands the most land where it is in competition with the maximum number of uses and users.

The central business district is most commonly the area of maximum demand for land for transportation purposes. Paradoxically, it is in just such areas that the streets are least adequate, while at the same time the competition for land makes areas for parking most costly and difficult to acquire.[17] In many cities the parking lots and garages in the fringe of the central business district may occupy more land than that devoted to all other uses. In Indianapolis, for example, within the square mile containing the central business district and immediately contiguous area more than 60 percent of the total land area is devoted to the movement and storage of automobiles.[18] In Chicago, over 26 percent of the total developed land in the city and contiguous suburban area is devoted to streets, alleys, and parking, while in the Loop area and immediate fringe about 34 percent of the total land area is devoted to such uses for accommodation of the automobile.[19] Vital though these land uses are, they are accessory to the basic uses. Because they occupy land which is potentially the most valuable in the city, planners are constantly seeking devices to reduce or divert automobile and truck usage from the congested nodal areas in the central portions of cities, and to use the land otherwise devoted to such uses to those which would yield a more direct economic return.

In many, if not most cities, the use of streets as vehicular terminals is restricted or prohibited in high-density areas. Daytime parking on the streets is prohibited in most downtown areas, and the provision of off-street parking on or near new office, apartment, and other types of commercial and public buildings is becoming mandatory, although such requirements are ordinarily not retroactive, so that the older buildings are not required to provide them. Also, off-street truck loading and unloading facilities are generally required in newly-constructed buildings which generate goods traffic. Most cities also provide some public off-street parking, often in multi-story open-deck structures or underground. These facilities may be financed by revenue bonds, issued by the municipality or a special-purpose parking authority, which are to be retired over a period of years by the revenues derived from the parking charges.

In most cities, the number of persons entering the central business district daily has not been increasing in recent years, and in some cities it has been declining.[20] However, in spite of construction of new inner-city by-pass highway routes, many people and vehicles still pass through the central business districts which have both origins and destinations outside. This is due to the radial pattern of highway and mass transportation routes in many urban areas, necessitating travel between pairs of outlying points, on the two sides of a triangle, the apex of which is the core of the city. Furthermore, the shift from mass transportation to the automobile has produced a substantially increased demand for automobile parking far out of proportion to the number of persons traveling to the central city area.

Although central business districts are still by far the most important generators of trips in most cities and metropolitan areas, their relative importance is declining, and a decreasing proportion of the total urban trips originate and terminate there. Furthermore, the functions of the CBD are changing. Retailing is declining, both relatively and absolutely in the central areas with the growth of outlying and suburban shopping centers and retail and service ribbons along the highways leading from the cities.[21] Improvements in transportation, distribution methods, and the growth of large-scale chain stores have reduced the relative demand for inventories and hence for warehousing space in the central areas of cities. Manufacturing has declined in such areas with the demand for more extensive sites in the outer areas of cities and beyond, while changes in living habits and transportation have been responsible for declines in the entertainment, restaurant and hotel, cultural and educational functions in the downtown areas of most cities. Only the office functions have been holding up to previous levels in downtown areas, and then only in some of the largest cities.[22] These trends have increased the demands for parking space far beyond the previous levels, for office employees are typically all-day parkers, while shoppers, theater-goers, and others with short-time demands have been rapidly decreasing in the downtown areas. The result of these trends is a greatly increased demand for all-day parking in the face of little or no increase, and in many instances a decrease, in the number of people entering the central areas.

Public and common carriers, on the other hand, do not generally require as much land in

the central areas of cities as in the past. The decline in use of mass transportation—elevated-subway trains, streetcars, buses, and suburban commuter trains—not only reflects the growth of the automobile and the relative decline of central business districts which they primarily serve, but also the changing functions of the central areas. Fewer buses and rail cars need to be provided with parking areas, and the automobile, requiring about 350 square feet per car, is a very inefficient user of space, not only when in motion, but also when idle. The decline in intercity railroad transportation has reduced the need for vast centrally-located depots and also for large coach storage yards which commonly have been located on the fringes of the central business districts. Freight yards and terminals have been moving outward from the central city areas to and beyond the urban peripheries, not only because in the latter locations they can obtain more land at lower cost and thus expand their facilities, but also because more and more industrial plants, which receive and ship freight, are locating beyond the congested urban areas, at lower densities than formerly, and the trains can be assembled and broken up with minimum distance for truck pickup and delivery or railroad car switching between freight yard and plant.[23] The increased use of motor trucks for pickup and delivery of most merchandise has freed many industries from dependence upon locations alongside railroad rights-of-way, and has accelerated the deconcentration of industrial establishments away from the central areas.[24] Similarly, water transportation, formerly seeking areas as close as possible to the centers of cities, where their freight and passenger traffic was generated, has been rapidly decentralizing into much more extensive areas, where larger sites are available for marine terminals and for industries which ship and receive bulk cargoes at their own wharves. As ships become larger, and as the container ship replaces the older break-bulk cargo ship in many liner trade routes, much more land area in relation to water frontage is required than the inner-city waterfronts can provide. Trucks cannot gain fast access through congested streets to the marine terminals, and the handling of container movements, which is responsible for a rapidly increasing proportion of the general merchandise shipments, requires ever-greater landward areas for sorting of the containers. Fifteen acres per ship berth is now regarded as minimal.[25] Thus, modern goods handling, involving integration of rail, truck, and water transportation, with use of door-to-door pickup and delivery by truck and with standardized containers or "piggyback"[26] has not only created greater flexibility in industrial location, but has also produced surplus land no longer needed for freight handling in and near the central areas of cities.

The newer forms of transportation, also, reinforce the decentralizing trend in use of land for goods terminals. Pipelines terminate at refineries or "tank farms," which require vast areas on and beyond the metropolitan fringes rather than in the central areas, while air transportation demands equally extensive areas for airports.

These trends are nearly all mutually reinforcing in releasing land in and near central city areas for uses other than transportation, and the reuse of such surplus (formerly transportation land) constitutes major opportunities for renewing major portions of the central areas of cities. The transportation organizations have not been remiss in seeking to take advantage of these opportunities. Railroads, traditionally among the leaders in industrial development, are now increasingly engaged in developing office buildings, residential communities, and other forms of land use, both in the central areas where they have released land from railroad use, and in outlying areas. Many of the railroads have reorganized as "conglomerates" in which urban real estate development, by subsidiary companies, are as important as their railroad operations in producing revenue.

Air Rights Developments

In spite of the increasing availability of surplus land formerly required for use as rights-of-way and transportation terminals, the demand for well-located urban land, especially with railroad and express highway access, is so great that planners and developers are much concerned with the possible use of "air rights," involving the use of space over the railroads and highways. Air rights developments are not a new concept; elevated and subway lines were constructed in the late nineteenth and early twentieth century over and under city streets. Two of the most noteworthy of the early railroad air-rights developments were the

Pennsylvania and Grand Central terminal areas in mid-Manhattan, with their intensive office building and hotel complexes over the railroads.[27] These are more than half a century old, and are the prototypes for many similar developments underway or proposed elsewhere.[28] The location of the railroad terminals, with their commuter and inter-city train services, created such a demand for nearby land that the terminals themselves became too valuable to retain, and, in the case of the Pennsylvania Station and the Union Station in Chicago, huge building complexes were built and are under construction directly over the terminals themselves, while in New York City, its largest office structure—the Pan Am Building—is directly over the railroad station platforms. In downtown Chicago, the Merchandise Mart—still the world's largest commercial building—was constructed on air rights over a railroad, and the Illinois Central's valuable downtown lakefront property is to be developed with air rights for a huge complex of office, apartment, and public buildings.[29] Smaller cities, such as El Paso, Texas, have developed major downtown buildings on air rights over railroads, while Akron, Ohio is about to have a major civic and entertainment facility built on a platform over several railroads, tying together a local university campus with the central business district. Following the lead of the railroads, cities are now beginning to develop intensive uses of air rights over highways for office buildings, apartments, civic buildings, and even parks.

Relocation Problems

The new and prospective express highways in many cities occupy very extensive portions of the total urban area. Their rights-of-way are commonly 300 or more feet wide, or the width of a city block. The problems of relocation of people and business establishments uprooted from the land acquired for urban expressways are vast and acute. A recent study in Chicago, for example, indicated that almost as many people had to be relocated for expressway construction as for all other forms of urban renewal.[30] The relocation problem is especially difficult because the spacing of expressways is closest in and near the fringe areas of the central business districts in order to handle the traffic generated by the core of the city. In such areas the radial routes converge, and there are commonly one or more inner distributor loop highways surrounding the central business district; the interchanges between the radial and circumferential routes require very extensive areas of land. It is usually in just such areas that the city's oldest housing, at lowest rents, attracts people who are the city's newest inmigrants, at the low end of the socio-economic scale, and these people are most commonly members of minority groups—Negroes, Puerto Ricans, and others who, because of their economic circumstances, are least able to compete for adequate housing. The population pressures thus generated by their removal to make way for traffic facilities are felt throughout the cities.

Transportation and the Form of the City

The patterns of transportation routes and facilities have molded the form of the city, and with each shift in the relative emphasis upon the various modes of moving people and goods to, from, and within urban areas, the form of the city has changed. The differences in availability of and accessibility to transportation in the various parts of cities and metropolitan areas has been, and continues to be, reflected in the changing shapes and patterns of urban growth and internal areal differentiation.

Before the application of mechanical power to transportation, proximity of residences and workplaces was essential, and the spread of the city was limited to the distances that footpower and animal power could traverse within a reasonable time. Because of the necessity for mutual proximity, cities were small, and densities of population and building coverage were very high.[31] Public transportation within cities was unknown.

The first form of mass transportation in cities was the horse-drawn omnibus, which first operated in Paris 1819, in London in 1829, and in New York in 1831.[32] These were the first vehicles to operate on regular routes and to accommodate anyone who wanted to ride, at a pre-determined fare. They were the first "common carriers" in intra-city service. Increased speed and smoother rides resulted when horse-powered vehicles were put on rails. The first street railways followed soon after the introduction of the omnibus; the New York and Harlem line of horse-cars began operation in 1832. Although a few additional cities had street railways before mid-century, diffusion of

the idea was very slow until the 1850's when, suddenly, scores of cities were provided with them.[33]

These mass transportation facilities, the omnibus and the street railway, both horse-powered, together served the internal transportation needs of most American cities until late in the nineteenth century. Because they operated on fixed routes, some parts of the cities became more accessible than others, and differences in population density became significant among the various sections of the cities. "Corridors" of high-density appeared along the streets which were used as omnibus and street railway routes. Most of these lines were privately owned and operated under franchise from the city, and commonly the operators used them as devices for land speculation, profiting from the increases in land values where the routes were placed. Often the lines were extended beyond the limits of the built-up area, and developments along the routes extending into the nearby countryside made the outlines of the urbanized area assume a star-shape, with the routes forming the axes of the tentacles. In some instances, the service beyond the end of the horse omnibus or streetcar lines was provided by lightly-constructed steam-railways—the nineteenth century counterpart of the early twentieth century electric interurban lines—opening up territory well beyond the previous limits of the urbanized area for residential development.

Meanwhile, the steam railroad became the dominant means of inter-city and inter-regional land transportation in the United States. The network of railroad lines was instrumental in locating and facilitating the development of many cities during the latter two-thirds of the nineteenth century.[34]

Most lines sought terminal locations as close to the center of the city as possible. It was there that the business concentrations and the hotels generated passenger traffic, the local internal transportation routes converged, the industries furnishing freight traffic were concentrated, and, in port cities, the ship and steamboat terminals were located. The fragmentation of cities by railroad lines, terminals and yards, and by the many industrial areas for which the railroad lines form the axes, still constitutes major characteristics of many cities.[35]

The railroads, furnishing faster transportation than was previously possible, were instrumentalities for land development in and near cities, as well as in rural areas. Stations were established along the lines, both inside and outside the cities, and inducements were offered to passengers to use the trains between their homes and their employment in and near the centers of the cities. These inducements were in the form of reduced or "commuted" fares for those who used the trains regularly; hence the "commuter" became the designation for one who travels daily between home and work. Around the outlying stations, residential development took place within walking or horse-and-buggy distance of the train stops, commonly also with a small business district near the station to capture the impulse-buying trade of the daily commuters. The suburban station became what contemporary transportation planners call an "intermodal interface," where transfer takes place between modes of transportation. Thus, along the railroad lines radiating from the city, suburbs began to develop, like beads on a string, with undeveloped or lower-density areas between the stations. Around many cities, several routes diverged, so that the strings of suburbs gave the urbanized area a star-shaped outline. At the outer fringes of some metropolitan areas which still have railroad commuter services, one can still observe the intermittent development of urban concentrations around the stations.[36]

Meanwhile, major technological changes were taking place in urban transportation.

The cable car, a solution to the problem of surmounting the steep grades on the streets of San Francisco which resulted from the imposition of a rectangular gridiron of streets upon hilly terrain, first appeared in that city in 1873. The cable lines made possible the development of mansions for the wealthy on Nob Hill and the other dominant elevations, and before long many cable lines in that city formed the major transportation facilities of the densely-populated city. From San Francisco the cable car spread to cities around the world, but its reign as an important urban transportation mode was short-lived. By the turn of the century, the cable car had passed its peak, and city after city abandoned it: Philadelphia in 1895, Chicago in 1906. By 1940 the cable car remained only in the city of its birth; in San Francisco

today it serves not only for local transportation but also as a major tourist attraction.[37]

The electric street railway constituted the principal form of urban mass transportation in all except the very largest cities from the 1890's until after World War II, and its effects upon the land-use patterns of cities are visible today nearly everywhere except in the post-war suburbs.

The first electric street railway was installed in the mid-1880's, and before the end of the following decade hundreds of cities, large and small, depended principally on the electric trolley cars for their principal internal passenger transportation. With the electric streetcar, travel time became more important than distance in the selection of locations for employment and residence, and the street railway services became major forces in shaping the internal patterns of cities as well as of accelerating their outward expansion. Access to trolley lines became major determinants of land values, reflected in higher land costs and density of development along the lines, and with especially high land costs and intensive development at the intersections of two or more routes, where, at transfer corners, major outlying retail shopping and service concentrations tended to develop.[38] Between the intersections, along the streets served by trolley lines, long ribbons of business developed.[39] Later, with the decline of the street railway, many of these ribbons, previously encouraged by excessive zoning for such uses far beyond the eventual demand, were characterized by vacant stores and deterioration.

Not only did the electric street railway, in the half-century of its predominance as the main internal transportation mode in most cities, produce lines and nodes of high-density residential and commercial development, but it also facilitated the spread of urbanization into the surrounding countryside. Many lines were built speculatively, with the hope that the developers would not only realize profits from the traffic which would increase as ridership was generated by the developments taking place along the routes but also would reap a harvest from increases in the land values themselves. Many street railway extensions were identified with real estate developments by the same sponsors.[40] One of the most famous surviving lines of this type is the Shaker Heights (Ohio) transit line, connecting that affluent suburb with downtown Cleveland. The developers of both Shaker Heights and its transit line, the Van Sweringen brothers, also developed the vast Terminal Tower complex at the other end of the line on Public Square, the downtown core of Cleveland, only to become victims of the Great Depression following the crash of 1929. But the electric street railway was essentially a local facility to serve the cities themselves. The steam railroads generally were the passenger carriers for the outer suburbs, where much of the urban expansion was taking place.

It was not long before the electric trolley car, in modified and heavier form, and generally on private rights-of-way like those of steam railroads or alongside rural roads, extended into the countryside and connected cities as many as several hundred miles apart. The electric interurban railway had the advantage over the steam railroad for commuter traffic in that the cars, either individually or as multiple-unit trains, could accelerate and decelerate faster, making more frequent stops possible without unduly extending the overall running time. The result was that many lines, in addition to those serving new radial routes from the cities, were constructed through the existing strings of suburbs which were previously developed along the steam railway routes. With stops more closely spaced, the electric interurbans were responsible, in many instances, for filling in of the gaps between the older suburban nuclei, creating more continuous tentacles of urbanization and absorbing the older nuclei into arms or tentacles along the radial routes, although, of course, the identity of the older nuclei remained. With continuous development along these "corridors" however, the coalescence of the suburbs created new problems of fragmentation of the areas into numerous municipalities and other local governmental areas. With a continuous urban mass, the jurisdictional boundaries became less meaningful in physical terms, and one could scarcely tell where one suburban city, town, or village ended and the next began.

The interurban electric railway, first developed about 1889, reached its peak about 1915, after which the advent of the automobile with its greater flexibility was responsible for declines in mileage and patronage. A few interur-

ban lines survived World War II, but by the 1960's they had all disappeared, either being abandoned or converted into standard-type railroads.[41] They left their marks upon the metropolitan landscapes, however, in the form of continuous strings of suburbs which coalesced into arms or tentacles of higher density development, radiating from the urban mass, than the wedges between them.

The trolley car, however, whether local, suburban, or interurban, could not cope with the higher densities of development and traffic demand in the largest cities, and such areas developed rapid transit lines. The term "rapid transit" refers to a relatively high-speed service operated on a right-of-way separated from other street traffic and usually consisting of railway lines.

In order to increase street capacity and to provide faster transportation than that available by street railways, grade-separated railway lines were provided in a number of large cities. In New York City, an elevated railway, operated with small steam locomotives, was opened in the 1870's, on Sixth Avenue, and Chicago's first "L" was placed in operation in 1892. Other lines were built in Boston and Philadelphia, and, in every instance, they precipitated rapid growth of both densities along their lines and urbanization of the land at the outer extremities. By the late 'nineties, the original lines were electrified, with multiple-unit trains, and new electrically operated elevated lines were built. Before long, however, it was realized that electric train operation made it feasible to place transit lines underground, and America's first subway line was opened in Boston in 1897. New York's first subway began operations in 1904.

Whether elevated, subway, or surface with grade separated street-crossings, rapid transit lines can carry tremendous masses of people. The extreme densities of Manhattan or Chicago's Loop would not be possible without them, and in both cities new lines are now being planned to serve even higher densities. On the other hand, the outer portions of rapid transit lines have been used to stimulate urbanization along radial axes, and in some instances, like surface street railways and interurbans, have been important stimuli to increased land values and development along their routes.[42] In North America, rapid transit lines are now in operation in New York, Boston, Philadelphia, Cleveland, Chicago, the New Jersey suburban areas of New York and Philadelphia, and in Montreal and Toronto, with systems planned or under construction in the Washington, San Francisco Bay, and Mexico City metropolitan areas, while several other large cities are planning them.[43]

These rapid transit lines represent investments of many millions of dollars per mile, and are justified only in situations where tremendous masses of people must be moved. Since only the central business districts of the very largest cities can generate such traffic volumes, it follows that rapid transit must, inevitably, be developed as radial lines serving the central business districts. In fact, in every metropolitan area which has or is planning them, they are used as devices for attempting to arrest or reverse the relative decline in importance of the central areas of the cities. Only during peak morning and evening rush hours do the passenger loads justify these vast expenditures. The future of rapid transit, therefore, depends upon the future of central business districts, and in most cities there is little prospect of the CBD's ever regaining the relative importance that they once had. Rapid transit, therefore, is a highly specialized facility: an instrument for preserving the functions and values of central-city areas by increasing their accessibility to the metropolitan residents for employment and other central functions.

Everywhere, the use of mass transportation has been declining in competition with the virtually ubiquitous automobile. In the United States, the annual number of passengers carried on all forms of transit declined from 12.2 billion in 1935 to 8.2 billion in 1967. Although the bus has replaced the streetcar nearly everywhere, bus riding declined from a peak of 9.8 billion passengers in 1945 to 5.7 billion in 1967. Subway and elevated riding fared somewhat better, with 1.9 billion riders in 1967 contrasted with 2.2 billion in 1935 and a peak of 2.7 billion in 1945.[44] It is clear that rapid transit continues to be a major element in the transportation pattern of the largest cities, while all other forms of mass transit are declining.

Almost everywhere, public authorities have taken over or are heavily subsidizing mass

transportation. Costs and fares have risen rapidly, and few private companies can profitably operate any form of public passenger transportation in urban areas. All rapid transit lines in North America are operated by local governments or specialized *ad hoc* transportation authorities, which, in most instances, have taken them over from private companies. Most commuter railroad services, likewise, are operated with some form of subsidy or, as in the case of the Long Island, the largest commuter railroad, is publicly owned. Public interest in these facilities, whether rail or bus, is justified by the necessity for retarding or arresting declines of the central areas of cities, accentuated by the fact that a declining proportion of the middle and upper income people live in the jurisdiction of central municipalities, and the tax base derived from commerce and industry is growing faster outside these cities than within them.[45] Also, many people cannot utilize automobiles effectively. Such persons include children, elderly people, others with handicaps rendering them incapable of driving an automobile, and the lowest-income people who cannot afford automobile transportation. Some form of transportation must be available for them.[46] In many cities, public mass transportation has so deteriorated that unduly long and expensive journeys are required for reaching industrial and other employment which is located at great distances from the portions of the city inhabited by those who most need the employment and can least afford the expensive and time-consuming journey to work.[47]

The Automobile and Urban Deconcentration

The overwhelming proportion of trips made in virtually every city and metropolitan area in the United States and Canada is by automobile. This is both a cause and an effect of the decline in mass transporation, and it has produced major changes in the land use patterns and densities of urban areas. No longer are most residents confined in their choice of home location to areas accessible by mass transportation, nor need they work in an establishment which is directly served by it. The automobile has produced flexibility and freedom of choice of location within almost all urban areas. The result has been a rapid acceleration of the rate of deconcentration of many urban functions. Land is being urbanized at a far more rapid rate than the rate of increase of the urban and metropolitan population, and the result is a substantial decrease in the average density of population in such areas, with an even more spectacular decrease in density of newly-developed areas.[48] The ranch house and split-level on its quarter-acre lot have replaced, for most people, the multiple-story apartment building in popularity, and the amount of land consumed for residential use is doubling about every twenty years. Also, industries are, for the most part, abandoning inner-city multiple-story buildings for extensive single-story plants with large setbacks from the highways and extensive areas for parking and employee amenities while shopping centers require five or six times as much area for automobile parking as they have in the shops themselves. Almost every urban function, except the concentrated office functions of the central city, requires more land than formerly.

Planners refer to "traffic generators," which are the areas where large numbers of trips are generated. Most trips originate or terminate on residential land, but at the other end is usually a node, such as a business district, shopping center, recreational facility, or other place where people concentrate. As cities expand, these generators are farther apart, as are also the residential ends of most of the trips because of the lower densities. Thus, in spite of the fact that the average automobile trip, rural and urban, is only eight miles, trips in urban areas are much longer than they once were, and a much smaller proportion of them are to and from the central business districts. In the words of the traffic engineer, the "desire line" pattern—the pattern of lines of travel which people desire to take between origin and destination regardless of availability of existing routes—is becoming very diffuse, whereas at one time the desire lines converged, like spokes of a wheel, on the central city hub. The density of traffic generation, like the density of population, is decreasing.[49] Few desire lines generate sufficient traffic to justify mass transportation, and so it has declined. Also, once a person has made a substantial investment in an automobile, he desires to spread the fixed charges over as many trips as possible. His depreciation, insurance, and license costs are largely independent of the extent of use of the vehicle. Thus, a decision to use private rather than mass transportation is usually based upon the transit fare

plus the inconvenience and longer duration of a transit trip as compared with the "out-of-pocket" costs—not the fully distributed overhead costs—of using the automobile. Transit usually comes out a poor second. No transit facility can guarantee a seat during rush hours, nor privacy, nor, in most instances, door-to-door service at the convenience of the rider.

To accommodate the automobile and motor truck, the street system, which is ubiquitous in all urban areas, is supplemented by a heirarchy of major traffic arteries: collector streets, arterial or preferential streets, and expressways or freeways, each successively designed to handle larger volumes of traffic over longer intra-city distances at higher speeds. In order to justify the expenditures on these arteries, traffic movements must be collected to create high volumes, and the automobile and truck constitute not only the collector and distributor vehicles, but also the vehicles for use on the high-density high-speed routes, without the necessity of transferring at a junction or "interface," as would be required if public transportation were used. Considerable circuity between origin and destination is common, in order to gain the advantages of uninterrupted movement on specialized arteries, particularly expressways and freeways. Thus, traffic is cumulated on major directional desire lines.

The modern expressway or freeway carries a major portion of the travel in most cities and metropolitan areas of North America, at speeds, except during the most congested peak times, of fifty or more miles per hour, free from cross-traffic, and with about one-third the exposure to accident risk of parallel surface streets. They have become the "trunk lines" of urban circulation. In most cities they form a radial pattern, focusing at the area of highest traffic generation, the central business district, but fanning out, and intersecting, at complicated multi-directional interchanges, with circumferential or "belt" expressways. Around most larger cities, there are several major circumferential routes, including, usually, a distributor loop road around the central business district and at least one outer belt near the edge of the urbanized area.

Most of these routes are parts of the Federal highway systems: either the "50-50" system in which the Federal government pays half the cost of construction, or the Federal System of Interstate and Defense Highways, authorized in 1956 and for which the Federal government pays 90 percent of the construction cost. Maintenance, however, in both instances, is a state and local responsibility, and, in some instances, an important problem to the state and local governments.

As in the case of the commuter railroads, trolley lines, and rapid transit lines which were built earlier, the expressways are major axes along which development tends to take place at higher densities than in the intervening wedges not as accessible. Furthermore, expressways are limited access highways, in which the abutting properties do not have the right of direct access, so conflicts between moving traffic, parked vehicles, and originating and terminating traffic along the route cannot exist. Since access and egress is only at certain points where connecting routes, such as cloverleafs, are provided, the most intensive development of land takes place near the access points, and particularly near the interchanges where two or more routes converge. At such points, major regional shopping centers may develop, along with truck terminals, motels, restaurants, automobile service stations, and other facilities dependent not only on the locally-generated traffic, but also upon the passing motorist and trucker. These facilities, furthermore, attract residential development, and so the nucleus of urbanization is localized. As in the earlier railroad era, suburban development takes place along the major expressways at higher density than elsewhere, forming strings of nodes or nuclei centering upon access points and interchanges, the modern analogy of the earlier railroad station. Land values increase sharply along such routes, although the noise and air pollution immediately adjacent to the routes retard such increases immediately adjacent to the roads; the maximum effects are felt at some distance away, where ridges of high land values are created.[30] On the whole, however, the land values and density of development of urban areas since the advent of the high-speed automobile and truck routes have spread out more than in the case of the earlier forms of transportation, since the motor vehicle is not confined to the high-speed high-density routes but operates door-to-door.

The result has generally been a filling-in of the wedges of land lying between the older radial prongs and tentacles of urban develop-

ment, but generally at lower densities than the older developments. The result is a "spread city"[51] or "urban sprawl."[52]

The "sprawl" is, however, not formless. There are "corridors" of denser development along the main routes, mostly radial focusing on the old city hub, with clusters of higher-density use and traffic generation, in the form of shopping centers, major institutions, intensively-used recreational areas, airports, and industrial districts along the corridors, and especially near the highway interchanges. Between these corridors, however, the developments are at lower density, and much open country may remain. Nevertheless, for every mile from the city center, the available land increases geometrically, so that the development of higher-speed and more ubiquitous transportation (highways, automobiles, and trucks) has accelerated the spread of the city and facilitated lower densities.[53] This, combined with the fragmentation of the metropolitan areas into many local governmental jurisdictions and the inability of most central cities to expand their boundaries to take in many of the new developments which compete with their older ones, is at the core of a high proportion of the major contemporary urban and metropolitan problems. The new freedom provided by modern transportation has its price.

Transportation Corridors

In attempting to mitigate as much as possible the uneconomic and unattractive urban sprawl, planners in many metropolitan areas are recommending that public works, such as water and sewer systems, and regulations such as zoning and other density controls, be provided in such manner that the higher densities will be developed close to the radial and circumferential transportation routes, including both expressways and other major highways as well as rail facilities with commuter and rapid transit services. Density gradients would be encouraged with peaks at and near rail stations and expressway interchanges, where community facilities, such as shops and local institutions would be accessible, as well as higher-density apartment and other residential developments, with decreases in residential density in every direction away from such nodes. To reinforce the linear arrangement of the corridors, several modes of high-volume transportation would be provided, with rail and highway routes parallel to each other. This type of pattern constitutes the basic arrangement of land uses and transportation for the comprehensive metropolitan plans of Washington,[54] Chicago,[55] and other large urban agglomerations.[56] It has been tested against alternative arrangements in many instances and found to provide not only a generally satisfactory pattern, but also, specifically, a most economic one for minimizing the costs of transporation within the metropolitan complexes.[57] Reducing air pollution along the main automobile and truck routes, however, remains a serious problem.

In many instances, two or more cities have suburban tentacles along the main transportation corridors which reach toward each other and eventually coalesce. The best known of these is the megalopolis between Boston and Washington,[58] the scene of the "Northeast Corridor High Speed Ground Transportation" project,[59] in which the Federal government is contributing funds and expertise, in collaboration with the railroad which serves the most densely-traveled transportation corridor in North America. In addition to railroad passenger service improvements, other experiments in highway and air transportation, as well as with new and unconventional forms, are being tried. If the new trains and improvements in railroad lines and passenger services succeed there, the possibility is opened up for similar experiments in other corridors, and it is possible—though barely possible—that the downward descent of railroad passenger riding between cities up to several hundred miles apart may be reversed.[60] Regardless of the future forms of transportation which are available, in the inter-city corridors, as well as within the cities, the various modes must be closely articulated so that each will perform that part of the transportation service which it is inherently best able to perform, and so that interchange of passengers and goods at the "interfaces" or transfer points will involve minimum inconvenience and delay.[61] The intra-city and inter-city transportation facilities are, in many instances, inseparable. With improvements in speed and convenience the interaction between nearby cities will become increasingly important relative to the internal interactions within the respective cities and metropolitan areas.[62]

The Future of Urban Transportation

In spite of the attempts, some of which may be more or less successful, to use the patterns

of high-density transportation routes as axes of urban growth and to shape the structure of cities and metropolitan areas along these routes, there is little evidence that the major features of urban growth will differ very much in the future from what it has been in the past. Central areas *must* be supported, not because of the declining city tax base and loss of leadership alone, but also because the urban cores perform many functions more efficiently than they could be performed if decentralized. Low-income people, and the handicapped, *must* be provided with better access to jobs and to the urban cultural and social opportunities. Public transportation can only be provided, with existing technology, where there is a high density of traffic generation, culminating in central business districts and along the corridors of high accessibility, where mass transportation as well as expressways for high-density vehicular movement can be provided. A "balanced" transportation system must be a public responsibility.

In evaluating the prospective futures for cities and internal transportation, two major considerations are involved: (1) technological change, and (2) comprehensive planning and government policy.

There is little possibility that mass transportation, except to and from central business districts and then only along high-density radial corridors, will become as important as it once was. The automobile, in some form, is with us to stay as far as we can foresee, in spite of the costs, including the long-range costs of air pollution. It may have new types of motive power, such as turbines, electric or steam motors, and it may be subjected to automatic guidance and control along high-density expressways. Rail rapid transit, essentially in its present two-rail form, or as monorail lines, or "transit expressways" of light cars, will play a role,[63] but a relatively minor one in most cities. Urban sprawl will be relatively reduced as effective comprehensive and metropolitan planning may become more significant in shaping the future urban areas, but this will require major new governmental organizations and devices.

Comprehensive planning is now mandatory as a prerequisite for federal aid, in the form of technical assistance, loans, and grants, in many programs. These include highways and mass transportation, as well as such physical improvements as sewer and water systems, open space land acquisition, urban renewal, and many others, as well as for a wide variety of social programs. Since 1965, transportation planning and land use planning must be carried on together, if Federal aid is sought, and it must be for areas larger than individual municipalities within metropolitan complexes. Section 701 of the National Housing Act provides Federal matching funds for comprehensive planning in metropolitan regions, and the creation and operation of regional planning and coordinating agencies is required in order for a region to gain access to Federal assistance. Such agencies must agree that any of a wide variety of specified types of projects and programs conform to metropolitan planning principles.

These requirements did not spring upon metropolitan areas suddenly. For many years, origin-destination traffic surveys had formed the basis for planning of highway and other transportation facilities in metropolitan areas, but frequently they were not well coordinated with other plans that local and metropolitan agencies were developing.[64] During the past few years, however, an increasing number of metropolitan areas, with federal and state aid, had developed techniques which were applied to studies of the relationships between land use patterns and traffic generation, and these relationships were projected as future alternative patterns, from which the most efficient were selected as the bases for metropolitan plans.[65] The reports resulting from these studies, and the masses of unpublished data in the files of the planning agencies, are extremely useful as aids in comprehensive planning, particularly in relating land use proposals and transportation systems to each other as the basic physical elements of comprehensive plans for the cities and metropolitan areas of the future. Comprehensive urban and metropolitan planning is an art, but it is also becoming a science.[66]

FOOTNOTES

[1] For discussion of the economic functions of cities see the second article in this series: Harold M. Mayer, "Making a Living in Cities: The Urban Economic Base," *Journal of Geography*, LXVIII,

2 (February 1969), 70-87.

[7] Torsten Hagerstrand, "Aspects of the Spatial Structure of Social Communication and the Diffusion of Information," *Regional Science Association, Papers*, XVI (1965), 27-42; Richard L. Morrill, "Waves of Spatial Diffusion," *Journal of Regional Science*, VIII, 1 (Summer 1968), 1-27.

[8] Some geographers include transportation as a form of communication. Here we separate the two, and consider transportation as the movement of people and goods.

[9] The Law of Comparative Advantage is explained in most standard textbooks in economics; for example: Paul A. Samuelson, *Economics* (4th ed.; New York: McGraw-Hill Book Co., 1951), pp. 648-671.

[10] K. J. Kansky, *Structure of Transportation Networks: Relationships Between Network Geometry and Regional Characteristics*, Research Paper No. 84 (Chicago: University of Chicago, Department of Geography, 1963); Peter Haggett, "Networks," chapter 3 of *Locational Analysis in Human Geography* (New York: St. Martin's Press, 1966), pp. 61-86.

[11] For discussion of nodal regions, see the first article in this series: Harold M. Mayer, "Cities and Urban Geography," *Journal of Geography*, LXVIII, 1 (January 1969), 6-19.

[12] Robert B. Mitchell and Chester Rapkin, *Urban Traffic, A Function of Land Use* (New York: Columbia University Press, 1954).

[13] For further development of this theme, see any standard book on urban real estate; for example: Richard U. Ratcliff, *Urban Land Economics* (New York: McGraw-Hill Book Co., Inc., 1949, and subsequent editions); also Ratcliff, *Real Estate Analysis* (New York: McGraw-Hill Book Co., 1961); Ernest M. Fisher and Robert M. Fisher, *Urban Real Estate* (New York: Henry Holt and Company, 1954); Arthur M. Weimer and Homer Hoyt, *Principles of Real Estate* (3rd ed., 1954, and subsequent editions; New York: The Ronald Press Company). For more detailed discussion of relations between transportation and urban land use, see: Lowdon Wingo, Jr., *Transportation and Urban Land* (Washington: Resources for the Future, Inc., 1961); Walter G. Hansen, "How Accessibility Shapes Land Use," *Journal of the American Institute of Planners*, XXV, 2 (May 1959), 73-77.

[14] Richard M. Hurd, *Principles of City Land Values* (1st ed., New York: The Record and Guide, 1903; 1924 edition reprinted 1967).

[15] Charles C. Colby, "Centrifugal and Centripetal Forces in Urban Geography," *Annals* of the Association of American Geographers, XXIII, 1 (March 1933), 1-20.

[16] Ernest W. Burgess, "Growth of the City" in *The City*, ed. by Robert E. Park, Ernest W. Burgess, and Roderick D. McKenzie (Chicago: The University of Chicago Press, 1929), pp. 47-62; ——— ———, "Urban Areas" in *Chicago: An Experiment in Social Science Research*, ed. by T. V. Smith and L. D. White (Chicago: The University of Chicago Press, 1929), pp. 113-138.

[17] Homer Hoyt, *The Structure and Growth of Residential Neighborhoods in American Cities* (Washington: Federal Housing Administration, 1939).

[18] Chauncy D. Harris and Edward L. Ullman, "The Nature of Cities," *Annals of the American Academy of Political and Social Science*, CCXLII (November 1945), 7-17.

[19] Harland Bartholomew, *Land Uses in American Cities* (Cambridge: Harvard University Press, 1955).

[20] John H. Niedercorn and Edward F. R. Hearle, *Recent Land-Use Trends in Forty-eight Large American Cities* (Santa Monica, California: The RAND Corporation, 1963).

[21] Allen D. Manvel, "Land Use in 106 Large Cities," in *Three Land Research Studies* (Washington: The National Commission on Urban Problems, 1968), pp. 19-60. The percentages of total city area are somewhat misleading, since cities vary greatly in the extent to which undeveloped land is included within the municipal areas. Cities in the southwestern states typically are "overbounded," with, consequently, low percentages of their areas in streets, while older cities in the East tend to be more fully developed with streets serving a higher proportion of the municipal areas. Honolulu has the lowest proportion of its municipal area in streets—only 1.6 percent—but it is atypical. Actually, the percentage of total area in streets is less significant than the total of developed area.

[22] Among studies of parking in high density areas are: *Parking in the City Center* and *Transportation and Parking for Tomorrow's Cities* (New Haven: Wilbur Smith and Associates, 1965 and 1966, respectively), and Dietrich Klose, *Metropolitan Parking Structures* (New York: Frederick A. Praeger, Inc., 1966). The *Traffic Quarterly* frequently publishes studies of parking.

[23] *Central Business District Plan for Metropolitan Indianapolis* (Indianapolis: Metropolitan Planning Department of Marion County, Indiana, 1963), p. 3.

[24] Calculated from *Chicago Area Transportation Study, Final Report, Vol. I, Findings* (Chicago, 1959), pp. 110-111.

[25] For example, in Chicago a cordon count has been taken of people and vehicles entering and leaving the central business district on a weekday each year since 1926. In 1926 the number entering on the day of the count was 880,859; in 1968 the number coming into the same area was 854,221. *Cordon Count Business District, City of Chicago, 1968* (Chicago: Department of Streets & Sanitation, and Bureau of Street Traffic, 1968).

[26] Further development of this theme is contained in the third article in this series: Bart J. Epstein, "External Relations of Cities: City-Hinterland," *Journal of Geography*, LXVIII, 3 (March 1969), 134-147.

[11] In Manhattan south of 60th Street (New York's Central Business District) total floor space increased by less than 3 percent in nearly thirty years (1935-63), while office space increased from 128 to 187 million square feet, or from 24 to 35 percent of total floor space in the area. Tri-State Transportation Commission, *Manhattan Business District Floor Space Trends* (New York, 1967). In the central area of Chicago, general office space increased from 30.5 million square feet to 37.0 between 1955 and 1966; retail space decreased from 13.8 to 12.1 million square feet; wholesaling, warehousing, and manufacturing space decreased from 11.1 to 7.7 square feet, and off-street parking space increased from 4.0 to 6.0 million square feet. *Transit Planning Study, Chicago Central Area, Vol. III* (Chicago: Department of Development and Planning, 1968).

[12] These trends have been in evidence for many years. See: Harold M. Mayer, "Railroads and City Planning," *Journal of the American Institute of Planners*, XII, 4 (Fall 1946), 2-18, and Benjamin Chinitz, *Freight and the Metropolis* (Cambridge: Harvard University Press, 1960), pp. 153-157.

[13] Harold M. Mayer, "Some Current Trends Affecting the Value of Industrial Property," *The Appraisal Journal*, XXVI, 1 (January 1958), 87-96.

[14] Roger H. Gilman, "Cargo Handling," *Scientific American*, CCXVI, 4 (October 1968), 80-881.

[15] "Piggyback" or TOFC (trailer-on-flatcar) is distinguished from container movements in that the truck semi-trailer, with wheels, is placed on the railroad car, rather than a container, or box, which is moved without the truck wheels. For discussion of piggyback see: Paul J. Schwind, "The Geography of Railroad Piggyback Operation," *Traffic Quarterly*, XXI, 2 (April 1967), 237-247.

[16] W. P. Pence, "Railway Terminal Air Rights Developments and the Movement of Local Land Values," *Journal of Land & Public Utility Economics*, V, 2 (May 1929), 150-168.

[17] There is a substantial literature on air-rights developments, for example: *Air Space Utilization* (Washington, D.C.: National League of Cities, 1968); *A Study of Airspace Utilization* (Washington, D.C.: U. S. Bureau of Public Roads, 1968); and Charles Slavis and Louis J. Pignataro, "Utilization of Air Rights Over Highway Right-of-Way," *Traffic Quarterly*, XXIII, 1 (January 1969), 29-44.

[18] *Lakefront Development Plan, Central Area, Chicago, Illinois* (Chicago: Skidmore, Owings & Merrill, *et al.*, 1966); Harold M. Mayer, "Air-Rights Development on Downtown Chicago's Lakefront," *Land Use Controls* (Chicago: American Society of Planning Officials, I, 1 (1967), 1-10; *Illinois Central Air Rights Development* (City of Chicago Department of Development and Planning, 1968).

[19] Jack Meltzer, *et al.*, *Selected Aspects of Urban Renewal in Chicago* (University of Chicago Center for Urban Studies, 1965), p. 14.

[20] There are many vivid descriptions of the extent of crowding and the limited areal spread of "pre-industrial" cities, both in the early United States and elsewhere. A recent analysis of population densities and areal extent of ancient cities is: Norman J. G. Pounds, "The Urbanization of the Classical World," *Annals* of the Association of American Geographers, LIX, 1 (March 1969), 135-157.

[21] An interesting and vivid account of early developments in urban mass transportation is in: John Anderson Miller, *Fares Please!* (New York: Dover Publications, Inc., 1960).

[22] Arthur J. Krim, "The Innovation and Diffusion of the Street Railway in North America," (unpublished master's thesis, University of Chicago Department of Geography, 1967).

[23] The growth in numbers and sizes of American cities in relation to changes in transportation technology is discussed in: John R. Borchert, "American Metropolitan Evolution," *Geographical Review*, LVII, 3 (July 1967), 301-332.

[24] Harold M. Mayer, "The Railway Terminal Problem of Central Chicago," *Economic Geography*, XXI, 1 (January 1945), 62-76; S. H. Beaver, "The Railways of Great Cities," *Geography*, XXII (1937), 116-120; J. H. Appleton, "Railways and the Morphology of British Towns," *Urbanization and Its Problems*, ed. by R. P. Beckinsale and J. M. Houston (Oxford: Basil Blackwell, 1968), pp. 92-118.

[25] For discussion of commuter railroads in contemporary metropolitan areas, see: David Neft, "Some Aspects of Rail Commuting: New York, London, and Paris," *Geographical Review*, XLIX, 2 (April 1959), 151-163; H. P. White, "London's Rail Terminals and their Suburban Traffic; A Geographical Appraisal of the Commuter Problem," *Geographical Review*, LIV, 3 (July 1964), 347-365.

[26] Edgar M. Kahn, *Cable Car Days in San Francisco* (Stanford University Press, 1940).

[27] For discussion of the evolution of this pattern of outlying business centers, see: Homer Hoyt, *One Hundred Years of Land Values in Chicago* (University of Chicago Press, 1933); Malcolm J. Proudfoot, "City Retail Structure," *Economic Geography*, XIII, 4 (October 1937), 425-428; Harold M. Mayer, "Patterns and Recent Trends of Chicago's Outlying Business Centers," *Journal of Land & Public Utility Economics*, XVIII, 1 (February 1942), 4-16.

[28] Brian J. L. Berry, "Ribbon Developments in the Urban Business Pattern," *Annals* of the Association of American Geographers, XLIX, 2 (June 1959), 145-155.

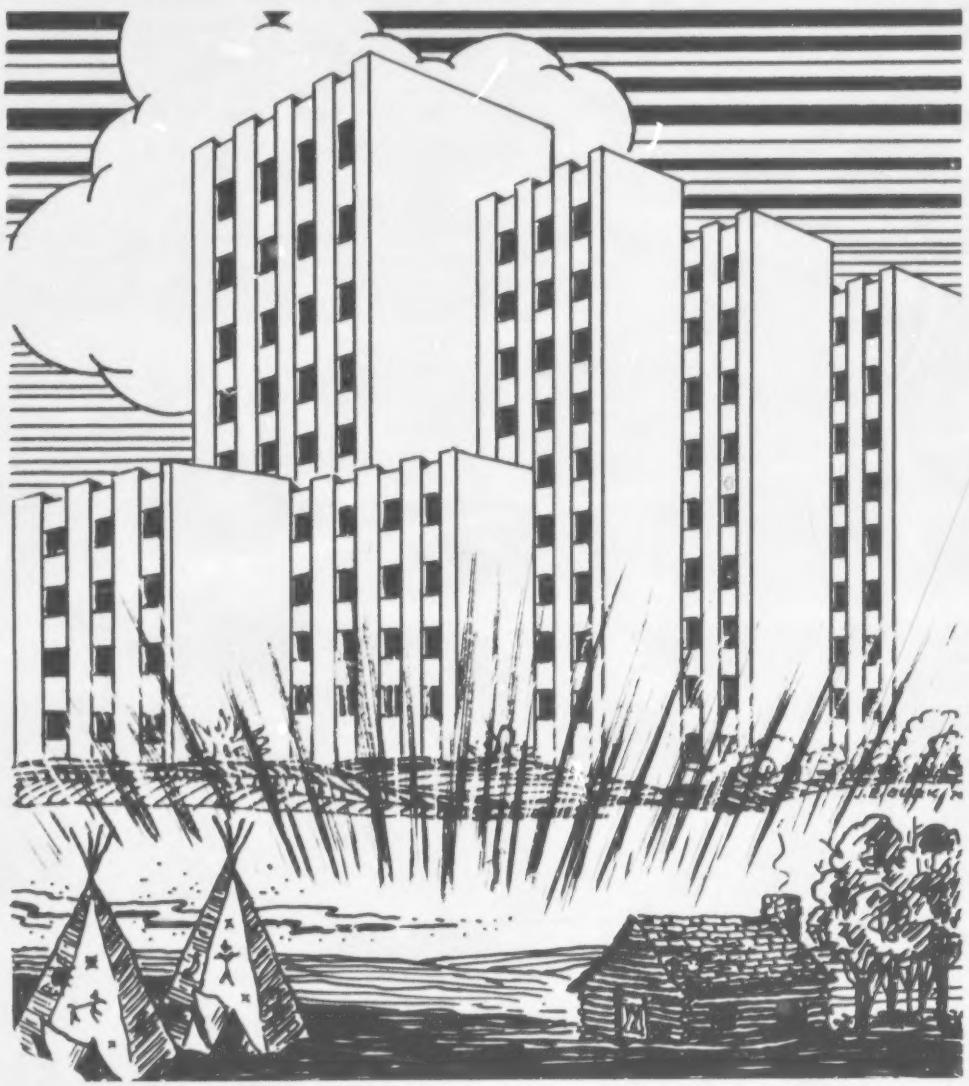
[29] An excellent discussion of the role of street railways in urban expansion is: Sam B. Warner, Jr., *Streetcar Suburbs; The Process of Growth in Boston, 1870-1900* (Cambridge: Harvard University Press and the M.I.T. Press, 1962).

tion Administration, *Tomorrow's Transportation: New Systems for the Urban Future* (Washington, D.C.: Government Printing Office, 1968).

[14] A discussion of the relationships of transportation and land-use planning studies in several metropolitan areas in the 1950's is: Robert Hoover, Harold M. Mayer, Lowdon Wingo, Jr., and Harvey S. Perloff, "Metropolitan Transportation Policy," *Papers and Proceedings, The Regional Science Association*, VII (1961), 223-262.

[15] Among the comprehensive transportation-land use studies of large metropolitan areas, the following are especially noteworthy for development of innovative techniques: *Detroit Metropolitan Area Traffic Study* (2 vols., Detroit, 1955 and 1956); Chicago Area Transportation Study, *Final Report* (3 vols., Chicago, 1959-61); Pittsburgh Area Transportation Study, *Final Report* (2 vols., Pittsburgh, 1961 and 1963).

[16] Other recommended references on urban transportation and its relation to city and metropolitan problems include: Wilfred Owen, *The Metropolitan Transportation Problem* (rev. ed., Garden City, N.Y.: Doubleday & Co., Inc., 1966); J. R. Meyer, J. F. Kain, and M. Wohl, *The Urban Transportation Problem* (Cambridge: Harvard University Press, 1965); Lyle C. Fitch and Associates, *Urban Transportation and Public Policy* (San Francisco: Chandler Publishing Co., 1964); *Metropolitan Transportation—1980* (New York: The Port of New York Authority, 1963).



Megalopolis: Intermetropolitan Coalescence

Irving Cutler

If present trends continue, by the end of this century the majority of the people in the United States will be living in a few major urbanized regions or Megalopolises[1] each extending for hundreds of miles and some containing over 50 million people. The growth of these extended urbanized stretches formed by the coalescing of metropolitan areas has been one of the most significant demographic developments that has taken place in the nation in recent decades. Megalopolis has evolved from a series of ever-enlarging urban forms whose growth correlated with changing economic, technological, and cultural conditions and the rapidly increasing percentage of our fast growing population living in urban areas. This unprecedented and uncontrolled increase in the magnitude of the urban areas has created problems of great complexity.

[1] The term megalopolis refers to a virtually continuous extended urbanized zone containing more than one metropolitan area. The term Megalopolis is applied particularly to the urbanized Northeastern Seaboard of the United States as delimited in the pioneering study of Jean Gottmann, *Megalopolis* (New York: The Twentieth Century Fund, 1961).

THE EVOLUTION OF MEGALOPOLISES

The first U.S. Census in 1790 showed that only about 200 thousand or about 5 percent of the population lived in urban areas. This percentage initially increased slowly so that half a century later, in 1840, only about 10 percent of the population lived in urban areas. Thereafter there was a rapid and quite consistent increase in the percentage of urban dwellers, averaging about 5 percent per decade, until today the urban population comprises over 70 percent of the population of the United States or over 140 million people.

The first major urban surge coincided with the industrial revolution around the middle of the last century. The urban pattern that evolved was the industrial city with its smoking factories in and around the central core of the city and with the workers living in crowded conditions within walking distance of the factories. The major industrial cities were in the northeastern part of the United States and were usually located along waterways; the cities were small in area but relatively dense in population. As industry grew and internal transportation improved with the introduction of the horse-drawn omnibus and later the cable

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car and electric street car, workers could live farther away from their factories—thus cities increased in both area and population.

A second stage of urban development came with the establishment of railroad commuter service in the latter part of the last century. It now became possible for people to build homes in the rural area outside of the congested industrial city and still be able to commute readily to their places of employment in the central city. Suburban settlements began to develop along the railway tentacles radiating out of the larger central cities. Initially the settlements were concentrated around the suburban railway stations and the population pattern resembled what has been aptly called beads on a string.

The advent of the automobile at first only broadened the urban pattern established by the railroads. But as the automobile and good highways became ubiquitous, with automobile ownership increasing from about 2 million in 1915 to 26 million in 1930, the surge to the suburbs was greatly increased. Urban sprawl spread in area and increased in complexity. The process was temporarily retarded by the depression and World War II but was greatly accelerated after the war with the rush of population now into the relatively sparsely populated area between the railroad tentacles—the interstitial area. New expressways and over 80 million automobiles today have helped open vast new areas to settlement to accommodate our growing urban population who could not find suitable residences in the densely settled cities and who preferred the amenities of the suburbs to those of the central city. The result has been the creation of sizable metropolitan areas comprised of the central city and its suburban area.

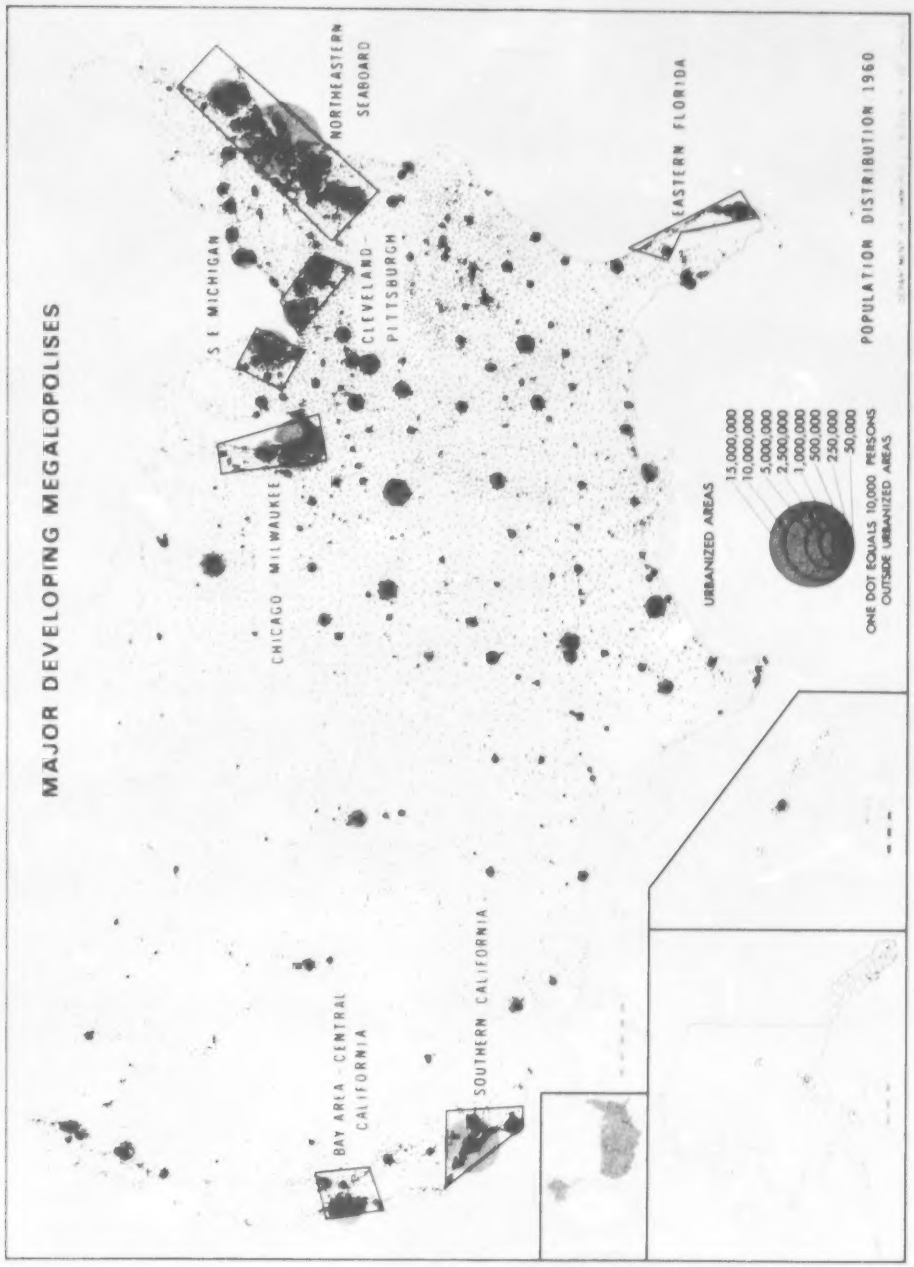
The population of the metropolitan areas has been growing rapidly—but only in the suburbs. In the last half century suburban growth has been more than triple that of national population growth and also greatly exceeds that of the previously expanding central cities. From 1950 to 1960 the population of the nation's suburban communities grew 55.6 percent while the central core cities grew only 2.8 percent. By 1963, the number of people living in the suburban areas had surpassed the population of the central cities.

As the suburban population expanded, the area encompassed by the suburbs increased even more rapidly since the population density was much lower and on more spacious lots than in the central city. A large central city now usually has suburban areas around it extending 10, 20, 30, 40 or more miles from it in an ever widening geometric arc as distance from the central city increases. In recent decades, in the more urbanized parts of the United States, the tentacles of the rapidly growing suburban fringe of one metropolitan area have often merged with the also rapidly growing suburban fringe of one or more other metropolitan areas resulting in an almost solid urban sprawl stretching for many dozens or even hundreds of miles. This phenomenon of intermetropolitan coalescence is developing at an accelerated rate and has become the most recent and largest type of urban form, the megalopolis, and one which will become increasingly important economically, socially, and politically.

DISTRIBUTION OF DEVELOPING MEGALOPOLISES

The largest and most important example of intermetropolitan coalescence in the United States is the northeastern urbanized seaboard of the United States called Megalopolis. (Figure 1) This polynuclear urbanized area of almost 600 miles extends from northern Virginia to southern New Hampshire, and from the Atlantic shore to the Appalachian foothills. It was formed by the coalescence of the metropolitan areas of a number of old large seaports such as Boston, New York, Philadelphia, and Baltimore. It is axial in shape and has one of the densest transportation networks in the world.

As Gottmann noted in his book *Megalopolis*, the area with 1.8 percent of the land area of the United States has about 20 percent of the nation's population (about 40 million with a population density of about 700 per square mile) and about 25 percent of the manufacturing capacity of the country. Virtually all of the recent growth has been in the suburban areas. Despite a total population increase in the 1950-60 decade from 31.9 million to 37 million, 22 of the 27 largest cities in Megalopolis actually lost population during the decade. But overall the growth of Megalopolis is expected to continue its increase, estimated at perhaps another 60 percent by the end of the century.



Megalopolis has evolved over three centuries; today it is the prime laboratory for the study of the new urban order that is changing the American landscape. Here unplanned urbanization, in an area with one of the highest standards of living in the world, is spreading out far and wide, crossing numerous state boundaries, obliterating many of the old distinctions between rural and urban, rearranging the sphere of influence of the big cities, and

creating many opportunities as well as problems.

While the Megalopolis of the Northeastern Seaboard is unmatched in the nation in size, density, output, and complexity, it is but one of a developing pattern of such agglomerations or supercities that are developing in the United States and in other parts of the world.[2] Among the larger megalopolises (although far behind the 40 million population of the Northeastern Seaboard) developing in the United States with their estimated population in 1969 are Southern California, 12 million; Chicago-Milwaukee, 11 million; Pittsburgh-Cleveland, 8 million; Southeastern Michigan, 7 million; and the Bay Area-Central California, 6 million. In addition, there are over a dozen smaller areas of developing intermetropolitan coalescence with present populations ranging from about 1½ million to 3 million.

The growth rate of these urban regions is expected to average an increase of close to 25 percent during the next decade with above average growth especially in the urban regions of Florida (the fastest growing), California, and Texas. As urbanization spreads, it is expected that in time a number of today's developing megalopolises will themselves merge into each other forming even more extensive urban stretches, perhaps in time rivaling that of the Northeastern Seaboard. The prime areas for such development appear to be the Great Lakes area from eastern Wisconsin to western Pennsylvania and including the Milwaukee, Chicago, Detroit, Cleveland, and Pittsburgh areas with an estimated 1980 population of about 37 million; the merging of the two California megalopolises—Southern California and the Bay Area-Central California—should produce an extended megalopolis of about 27 million; the most rapidly growing Eastern Florida area should merge by 1980 with the almost as rapidly growing Florida West Coast area producing an urbanized region of about 10 million. These three megalopolises with a projected combined population of 74 million plus the estimated 50 million 1980 population of the Northeastern Seaboard should account for almost half of the United States population of 1980. By the end of the century, if present trends continue, it is probable that the Great Lakes and Northeastern Seaboard megalopolises will have merged.

The phenomenon of intermetropolitan coalescence and the development of megalopolises is not confined to the United States only. It is a phenomenon found in many growing parts of the world associated with the trends toward industrialization and urbanization. Examples of foreign areas showing possible future major megalopolitan trends are the Rhine-Ruhr area, the Midlands of England, São Paulo-Rio de Janeiro, the Rio de La Plata area, Tokyo-Yokohama, and Osaka-Kobe.

Looking even farther into the future, the urban planner Constantinos Doxiadis foresees continuous growth of the world's urban population to the extent that about a century from now the great majority of the world's population will live in a vast world city—"Ecumenopolis"—made up of interlocking megalopolitan areas.[3]

[2] Other studies of coalescing areas, besides Gottmann's *Megalopolis*, include the E. Hoover and R. Vernon, *Anatomy of a Metropolis* (Garden City: Doubleday, 1962) which is part of the nine volume New York Metropolitan Region study and also I. Cutler, *The Chicago-Milwaukee Corridor: A Geographic Study of Intermetropolitan Coalescence* (Evanston: Northwestern University Studies in Geography, Number 9, 1965). The California coalescence is discussed in Howard F. Gregor, "Spatial Disharmonies in California Population Growth," *Geographical Review* (January 1963), pp. 100–22. C. A. Doxiadis in "The Great Lakes Megalopolis," *Ekistics* (July 1966), pp. 14-31, analyzes the possible future population patterns of the present sporadically urbanized extended area around the Great Lakes. The smaller Piedmont Industrial Crescent of North and South Carolina is examined in F. S. Chapin, Jr. and S. F. Weiss, eds., *Urban Growth Dynamics in a Regional Cluster of Cities* (New York: John Wiley and Sons, Inc., 1966). A similar study of a European area is T. W. Freeman, *The Conurbations of Great Britian* (Manchester: Manchester University Press, 1959). The population estimates are based largely on extensive and valuable studies and projections of urban population trends in the United States that have been made through the years by Jerome P. Pickard of the Urban Land Institute and have appeared periodically in their official publication, *Urban Land*.

[3] Constantinos Doxiadis, *Ecumenopolis: Toward the Universal City* (prepared for the National Association of Housing and Redevelopment Officials, Washington, D.C., 1961).

MILWAUKEE
GREENFIELD
LAKE
WAUKESHA CO.
MILWAUKEE CO.
FRANKLIN
OAK CREEK
CHICAGO
MILWAUKEE
CORRIDOR
RACINE
CO.
WATERFORD
NORWAY
RAYMOND
CALEDONIA
WALWORTH CO.
ROCHESTER
RACINE
DOVER
YORKVILLE
MT. PLEASANT
POPULATION
DENSITY
1850
KENOSHA
BRIGHTON
PARIS
SOMERS
KENOSHA
CO.
WHEATLAND
PERSONS PER SQUARE MILE
0-30
31-99
100-499
RANDALL
SALEM
BRISTOL
PLEASANT PRAIRIE
WISCONSIN
ILLINOIS
ANTIOCH
NEWPORT
BENTON
LAKE VILLA
WAUKEGAN
MC HENRY CO.
GRANT
AVON
WARREN
WAUKEGAN
LAKE
CO.
WAUCONDA
FREMONT
LIBERTYVILLE
SHIELDS
SCALE IN MILES
0
5
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N
LIBERTY
VERNON
W. DEERFIELD
DEERFIELD
KANE CO.
BARRINGTON
PALATINE
WHEELING
NORTHFIELD
NEW TRIER
COOK
CO.
HANOVER
SCHAUMBURG
ELK GROVE
MAINE
EVANSTON
NILES
CHICAGO

FIGURE 2

A CASE STUDY OF INTERMETROPOLITAN COALESCENCE

The area between Chicago and Milwaukee can serve as an example of the development of an emerging area of intermetropolitan coalescence. Figures 2, 3, and 4 illustrate the development through time by comparing township population densities and patterns at approximately half century intervals. This area, often referred to as the Chicago-Milwaukee Corridor, consists of all or part of five counties stretching about 70 miles along the southwestern shore of Lake Michigan.

Settlement started on a large scale in the 1830's, and in a few decades most of the land was occupied and used for agriculture. For almost a century thereafter, this was one of the most productive farm areas in the nation. The early urban population was almost all water oriented, clustered mainly along the lakeshore and to a lesser extent along some of the rivers. (Figure 2) The largest settlements, five highly competitive lake ports—Chicago, Waukegan, Kenosha, Racine, and Milwaukee—had been founded at lake sites where there were natural harbors. The growth of these port cities depended greatly on their location, adequacy of their harbors, and their connection with the farm hinterland. The much more rapid growth of Chicago and Milwaukee reflected their superiority in these factors, and after the first few decades, these two cities, especially the former, rapidly achieved commercial and industrial dominance.

The population of these five cities was concentrated initially in the heart of the cities around the harbor but expanded outward as population and industry grew and public transportation improved. Starting about 1860 and for about the next half century, railroads played an important role in the dispersal of population and the creation of suburbs along the railroad radials. Figure 3 shows the increase of population density throughout most of the area and especially the intensification of population along the coastal radial and the radial northwest of Chicago where good rail commuter service was offered. Frequently tiny farm villages became growing dormitory suburbs.

The rapid increase in automobile ownership and in improved highways in recent decades helped stimulate a rush and a diffusion of population and industry into the interstitial areas between the railroads with a great increase in population density throughout most of the area. (Figure 4) Whereas Chicago's population pushed out strongly, in comparison Milwaukee's population spread much more slowly because of its smaller population, transportation barriers, and the somewhat repelling effect of ethnic and industrial concentration south of the city. In between, the cities of Waukegan, Kenosha, and Racine have grown as industrial satellites, have developed a few small suburbs, and serve as an urban-connecting link between Chicago and Milwaukee.

The population density map of 1960 (Figure 4) shows a pattern similar to that found in other coalescing areas—a marked unevenness of population density. A close scrutiny of the area, on a microgeographic basis, reveals the many factors involved in the settlement pattern. The density is very high around the two big cities but generally declines with increasing distance from them, especially Chicago, as commuting distances become long and industrial decentralization to the far suburbs becomes less. Some gaps in urban coalescence are due to the presence of dunes, areas of poor drainage such as the Skokie Lagoons, sizable public parks, patches of residual agriculture, abandoned or sparsely-occupied military bases, and large landed estates.

Straddling the Wisconsin and Illinois border, but mainly on the Wisconsin side, is an area of eight contiguous townships with a population density of less than a hundred per square mile which is still almost completely agricultural as it was a century ago. This is the remaining remnant of what was once a much larger agricultural area. It is located on the fringe of growing urban areas but is still too distant, especially from the Chicago metropolitan area, to attract sizable settlement, although increasing numbers of non-farm rural inhabitants are moving into the area—a prelude to eventual urbanization. As in other such areas, when the non-farm rural population increases and some subdivisions develop, the farmers are faced with newly created problems regarding zoning, taxes, schools, sewage disposal, decreasing farm services, and rural-urban accommodation. It becomes increasingly difficult for farmers to continue, especially in the face of very lucrative offers for their land.

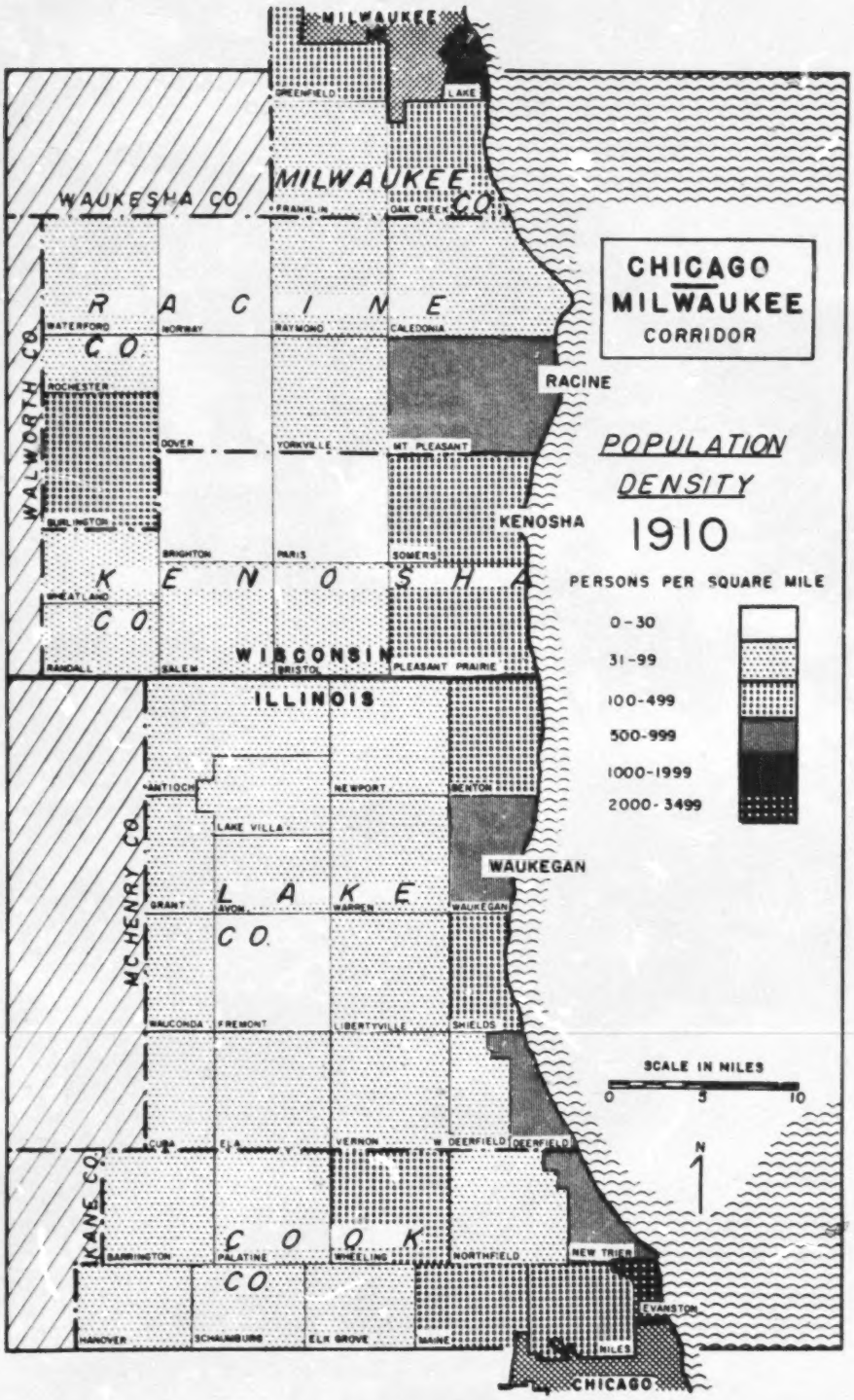
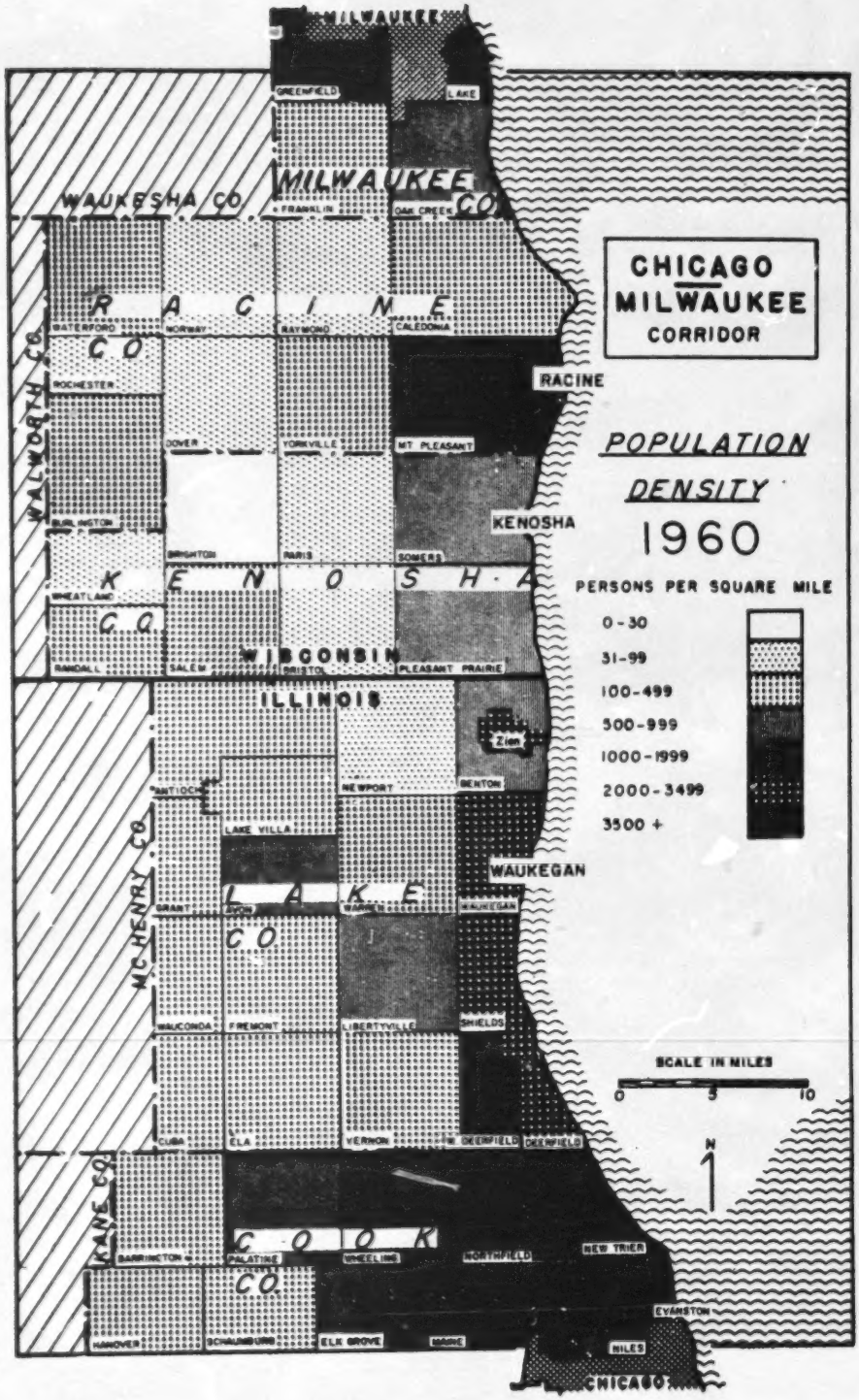

MILWAUKEE
GREENFIELD
LAKE
WAUKESHA CO.
MILWAUKEE CO.
FRANKLIN
OAK CREEK
CHICAGO
MILWAUKEE
CORRIDOR
RACINE CO.
WATERFORD
NORWAY
RAYMOND
CALEDONIA
RACINE
WALWORTH CO.
ROCHESTER
DOVER
YORKVILLE
MT PLEASANT
KENOSHA
BURLINGTON
BRIGHTON
PARIS
SOMERS
KENOSHA CO.
WHEATLAND
RANDALL
SALEM
BRISTOL
PLEASANT PRAIRIE
WISCONSIN
ILLINOIS
POPULATION
DENSITY
1910
PERSONS PER SQUARE MILE
0-30
31-99
100-499
500-999
1000-1999
2000-3499
ANTIOCH
NEWPORT
BENTON
LAKE VILLA
WAUKEGAN
MC HENRY CO.
GRANT
AVON
WARREN
LAKE CO.
WAUCONDA
FREMONT
LIBERTYVILLE
SHIELDS
SCALE IN MILES
0
5
10
N
CUBA
ELA
VERNON
W DEERFIELD
DEERFIELD
KANE CO.
BARRINGTON
PALATINE
WHEELING
NORTHFIELD
NEW TRIER
COOK CO.
EVANSTON
HANOVER
SCHAUMBURG
ELK GROVE
MAINE
NILES
CHICAGO

FIGURE 3


MILWAUKEE
GREENFIELD
LAKE
WAUKESHA CO.
MILWAUKEE CO.
FRANKLIN
OAK CREEK
RACINE CO.
WATERFORD
NORWAY
RAYMOND
CALEDONIA
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WALWORTH CO.
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YORKVILLE
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RACINE
BURLINGTON
BRIGHTON
PARIS
SOMERS
KENOSHA
KENOSHA CO.
WHEATLAND
RANDALL
SALEM
BRISTOL
PLEASANT PRAIRIE
WISCONSIN
ILLINOIS
Zion
BENTON
ANTIOCH
NEWPORT
LAKE VILLA
WAUKEGAN
LAKE CO.
GRANT
AVON
WARREN
MCHENRY CO.
WAUCONDA
FREMONT
LIBERTYVILLE
SHIELDS
CUBA
ELA
VERNON
W. DEERFIELD
DEERFIELD
KANE CO.
COOK CO.
BARRINGTON
PALATINE
WHEELING
NORTHFIELD
NEW TRIER
EVANSTON
HANOVER
SCHAUMBURG
ELK GROVE
MAINE
NILES
CHICAGO
CHICAGO
MILWAUKEE
CORRIDOR
POPULATION
DENSITY
1960
PERSONS PER SQUARE MILE
0-30
31-99
100-499
500-999
1000-1999
2000-3499
3500 +
SCALE IN MILES
0
5
10
N

FIGURE 4

Overall, the basic trend for the Chicago-Milwaukee Corridor is more people and the gradual filling in of most of the low density areas. Coalescence at high population density (well over 500 people per square mile except in one township) has been achieved within a thin veneer along the lake shore which has benefited in attracting people through the years by its water and rail advantages as well as by its aesthetic attractiveness. Now the areas west of the densely settled lake townships are filling in rapidly, especially where transportation is good, and, in the case of the extreme western part of the five counties, where there is the aesthetic attraction of over 100 inland lakes for recreation and residences.

This 70 mile segment between Chicago and Milwaukee is part of the larger 300 mile megalopolis that is developing between approximately Elkhart, Indiana around Lake Michigan to Green Bay, Wisconsin. This area in turn will become part of the Great Lakes Megalopolis stretching from eastern Wisconsin to western Pennsylvania—a mammoth example of the ever accelerating urban trend of intermetropolitan coalescence.

CHARACTERISTICS OF INTERMETROPOLITAN COALESCENCE

Each coalescing area has a settlement pattern that reflects such important developmental factors as location, historical past, and the basic physical, economic, and cultural geography of the area. On the basis of studies that have been made in several areas of intermetropolitan coalescence, a few characteristics seem to be common to most if not all of the areas.

1. Most large developing megalopolises have some common denominator—some *raison d'être*, some cohesive or cementing force. Coastal alignment which usually offers an advantageous location for population growth and spread is one such important force. The three largest agglomerations—The Northeastern Seaboard, Southern California, and Chicago-Milwaukee are basically examples of linear coastal coalescence. Coastal alignment also typifies many of the most rapidly growing urbanizing areas such as the Bay Area-Central California, Florida East Coast, Florida West Coast, Texas-Louisiana Gulf Coast, and Puget Sound. However, coastal alignment is not the only common denominator. Europe has areas of intermetropolitan coalescence that are centered on coal fields; the Carolina conurbation of southeastern United States is largely piedmont and fall line oriented.

2. Most coalescing areas are dominated by one nodal center such as New York, Chicago, Los Angeles, Detroit, or San Francisco. The influence and expansive power of a large city permeates the megalopolis. The size of the coalescing area is affected by the size of the nodal city, but the relationship is not a direct one.

3. One or more subsidiary metropolitan areas are present in each megalopolis that help give direction and form to the coalescing pattern. Chicago has Milwaukee, Southern California and the Bay Area-Central California have San Diego and San Jose respectively, and Megalopolis has sixteen large metropolitan areas including Boston, Philadelphia, Baltimore, and Washington.

4. It is almost axiomatic that in order to support its large population, a megalopolis must be important in manufacturing. Even the developing coalescence in Eastern Florida, which owes much of its initial growth to favorable climate and recreational conditions, owes its recent growth mainly to the coming of industry on a large scale.

5. Transportation plays a very essential but varying role in the developing, shaping, expanding, and linking of the coalescing area. It provides vital means of spatial interaction. The Northeastern Seaboard and the Chicago-Milwaukee Corridor reflected first a high degree of water orientation, then the radial pattern characteristic of mass transportation, and more recently widespread diffusion characteristic of the automobile era. On the other hand, Southern California, a more youthful urbanizing area, reflects a greater sprawl characteristic of much heavier automobile dependence and greater prevalence of single family homes. In recent years, the expressway has become the most important mode for the spread of urbanization and has fostered more flexibility, decentralization, and a decreasing dependence on the core of central cities.

6. A megalopolis is usually an urban arrangement in linear or corridor form.[4] The alignment may be along physical features, min-

eral resources, but most importantly along transportation routes which hold the area together, reinforce the pattern, and also allow for its expansion. Since the coming of the automobile, secondary diffusion is increasingly taking place laterally away from the corridor. A well-planned corridor pattern with the proper alignment of industry, shopping centers, public facilities, and residences along good transportation facilities can provide an efficient and functional urban arrangement with concentration of specialization and an economy of space.

7. Megalopolises, despite their rapid growth in area as well as population, are not great consumers of the total space of the United States. It is estimated that only about 1 percent of the land area of the country is actually urbanized, although this figure should double by the end of the century.[5] The land occupied by urbanization, however, is usually the most strategically located and has risen to relatively very high values. As raw or unimproved land it has probably more monetary value than all the other land of the nation combined. Very good agricultural land in the path of intermetropolitan coalescence, often enhanced by market proximity, usually slows down the spread of urbanization only temporarily; the quality of the agricultural land is of less significance than its proximity to powerful urban expansion pressures. Farms are the main source of sites for new urban development.

8. At the present state of urbanization, no coalescing area is even remotely a solid mass of dense population; numerous differing microregions are noticeable, including agricultural pockets. The Northeastern Seaboard may give the impression of being rather fully urbanized if it is viewed from Washington to Boston by train or along U. S. Highway 1. The impression, however, is quite different from the air which more readily reveals the broader picture showing that about 48 percent of its land area is woodland[6] and over half of the remainder is in agriculture. Only about 20 percent of the land is in actual urban use. The gaps in coalescence are also often due to physical factors or to public policy. The New York area has the Jersey Meadows, the Ramapos, and the parks and large estates along the Hudson River. Southern California has its mountainous areas and the Chicago-Milwaukee Corridor has its Skokie Lagoons and dunes.

9. Population density and intensity of land use decreases as one proceeds outward from the nodal city[7] and increases again as one approaches another metropolitan area with a resultant trough-like density pattern between the two metropolitan areas. The intensity of land use and the consequent population density appear to bear a generally direct relationship to the size and distance of the metropolitan cities.[8] The net effect of the intermetropolitan coalescence for the area as a whole is a lowering of the population density in comparison with that of the nodal cities. The populace has chosen to increase the size of the urban area rather than the density of the core cities.

10. The population outward from the central city is very uneven. It is usually greatest on the periphery of the nodal city with the surge outward greatest along major traffic arteries and where industrial dispersal is greatest, although the automobile brings about more diffusion of population. Frequently urbanization will "leapfrog" over a rural area resulting in a very irregular expanding urban fringe where rural and urban patterns are often interspersed. Settling farther from the urban nodal city by "leap-frogging" over a rural area is often due to the trading of distance from the central city for certain physical amenities and land cost advantages made possible largely by improved transportation. It may also reflect industrial dispersal which has created intervening work opportunities between the more distant settlement and the central city. Along the roads in the low density fringe area between coalescing metropolitan areas are often found many non-

[4] C.F.J. Whebell in "Corridors: A Theory of Urban Systems," *Annals* of the Association of American Geographers (March 1969), pp 1-26, analyzes the historical persistence of corridors through varying stages of economic and transportation development and the effect of corridors on the culture gradient, migration, urban hierarchy, and the political geography of an area.

[5] Marian Clawson, *Land for Americans* (Chicago: Rand McNally and Company, 1963), pp. 15-19.

[6] Gottmann, op. cit., p. 343.

[7] Hoover, op. cit., p. 129.

[8] Colin Clark in "Urban Population Densities," *Journal of the Royal Statistical Society*, Ser. A., Vol. 114 (1951), pp. 490-496, proposes a density gradient formula for urban areas which expresses the rate of diminution of density with distance.

farm rural dwellers, people enjoying, if only temporarily, rural living not too distant from urban areas.

SOME PROBLEMS AND PROMISES OF MEGALOPOLISES

The very nature and magnitude of megalopolis means that it usually has all of the severe problems of the big central city, such as inadequate housing, traffic congestion, air and water pollution, disposal of waste, deficient water supplies, racial tensions, lack of adequate recreational facilities, increasing crime rates, financial difficulties, etc., often compounded in severity. In addition there are problems that are unique to its structure and aggravated by the haphazard and rapid growth and by the newness and state of fluidity of megalopolis.

Many of the problems of megalopolis defy local solutions, but there is no megalopolitan-wide agency to deal with them comprehensively, so they often continue to grow. The water and air pollution of one community may create problems in another community; traffic congestion in Manhattan may back up into New Jersey; diseases and criminals do not respect artificial man-created boundaries.

Solutions are handicapped by the fact that although megalopolis is functionally interwoven with goods and people moving freely, politically it is fragmented by a multiplicity of boundaries and governments (including state and even international) which hinder any comprehensive action. In the Chicago-Milwaukee area, for example, there are several thousand governmental units, with the Chicago Standard Metropolitan Area alone having over a thousand, ranging from counties to mosquito abatement districts. Foremost of the disruptive boundaries is probably that between the central city and its surrounding suburbs, despite the symbiotic relationship between the two and the fact that both have problems that neither can solve alone and each is greatly affected by conditions in the other. To complicate the situation, the decentralization of industry and the continual movement of many of the best educated and wealthiest citizens out of the central city has generally tended to increase the leadership and tax base imbalance between the central city and the rest of the metropolitan area.

Attempted solutions are usually at the local level, often inadequate, conflicting, and uncoordinated, although some local governments, frequently prodded by federal and state agencies, have made limited cooperative efforts to tackle some of the pressing common problems. The problems of megalopolis can probably best be handled by administrative structures that can operate and plan on a megalopolitan-wide basis to offer megalopolitan solutions—an approach commensurate with the changing scope and nature of urban settlement.

Most of the population of the United States in the future will be living in megalopolises, although the internal pattern may be changed somewhat as new local community settlement forms are developed. It is important that megalopolis be recognized as a functional accommodation of the desire and manifestation of our burgeoning population for an urban way of life which offers the greatest number and variety of opportunities to fulfill the myriad of needs and preferences of our present society.

The spread of urbanization into giant agglomerations will require space and create urban sprawl and many vexing problems; but megalopolis is inherently not necessarily undesirable. With proper understanding, planning, and effort, and the wise use of technological improvements, it can be subject to orderly growth and the solution or at least alleviation of many of its problems. In regard to spreading urbanization, Professor Harold Mayer has written that the problem is not to reduce urban sprawl but rather to lessen its frictions and that

> urban problems arise through man's failure to direct and control them. Social and administrative institutions have lagged behind the spread of cities. Furthermore, the difficulties are compounded by the failure to understand adequately the diversity of ways of life which are offered by the variety of physical, social, and economic environments in the modern metropolis. It is the contention, here, that the large metropolis is the best form of settlement that has yet evolved, and that man has the potential to solve its problems.[9]

[9] Harold Mayer, "The Pull of Land and Space," Jean Gottmann and Robert A. Harper, eds., *Metropolis on the Move: Geographers Look at Urban Sprawl* (New York: John Wiley & Sons, 1967), p. 27.

The Future of Cities: Governmental Coordination and Planning

Harold M. Mayer

Certain generalizations have been developed by geographers and others regarding the form and structure of cities and urban areas and the patterns of urban growth.[1] These generalizations involve for the most part, probabilistic considerations; they do not tell us what will happen, but rather what is likely to happen. The actual occurrence of an event or situation is the result of human decision. A city, at any point in time, has a form, structure, economic base, political and social organization, and, indeed, population as the result of the cumulative decisions that have been made in the past.

[1] See the preceding articles in this series, especially: Harold M. Mayer, "Cities and Urban Geography," *Journal of Geography*, LXVIII, 1 (January 1969), 6-19; ——————, "Making a Living in Cities: The Urban Economic Base," Ibid., LXVIII, 2 (February 1969), 70-88; Bart J. Epstein, "External Relations of Cities: City-Hinterland," Ibid., LXVIII, 3 (March 1969), 134-147; Howard J. Nelson, "The Form and Structure of Cities: Urban Growth Patterns," Ibid., LXVIII, 4 (April 1969), 198-207; Jerome D. Fellmann, "Land Use and Density Patterns of the Metropolitan Area," Ibid., LXVIII, 5 (May 1969), 262-266.

Decision-Making and Urban Development

Some decisions are individually made; these include choices relative to the place and type of residential location and housing unit occupied by persons and families and the choices as to type and place of employment, as well as the mode of transportation and route between home and work. Some decisions are made by private organizations, including businesses, and some are made by the public, in the form of policies and legislation adopted by city councils, county commissioners, state legislatures, and the federal congress, and in the form of administrative decisions by public agencies. The extent to which public policies and decisions govern the private sector reflects the form and philosophy of the government, which may vary from place to place and from time to time. Some of the most complex and difficult decisions relative to the forms, structure, and growth of cities and metropolitan areas involve not only inter-governmental relations but also the relations between those decisions which are in the realm of public policy and action on the one hand and those which properly belong to the private sector on the other.

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As urban populations increase, the problems associated with the development of urban areas not only become more intense but also more numerous and complicated. The use of public powers, therefore, becomes increasingly necessary, and new forms of public intervention into the operation of the free real estate market have been developed and are being developed. The point at which private interests end and public action must be brought into play will vary with the nature and philosophy of government at any given time and place. In the United States, the increasing number and complexity of urban problems have made essential the development of new mechanisms for dealing with them, including a broadening of public powers. However, it is clear that the viewpoint most compatible with the traditions of the nation is that government should intervene only to accomplish those desirable objectives which private action alone cannot accomplish. The partnership of public and private policies and actions involved in the development of cities and metropolitan areas places great emphasis upon the planning process. Everyone does planning, but planning for the future of urban areas and regions involves certain procedures, processes, and professional competences in which geographers have played and are playing major roles.

Certain facilities and land uses which are of great significance to the public cannot be created or placed in the most desirable locations as the result of purely commercial market forces. Public intervention is necessary. No real estate market operations can possibly create or assemble a site for a public park or a highway. In the course of time, more and more purposes are served by public action, guiding and regulating private decisions in the public interest, and a knowledge of the nature of the processes and manifestations of decision-making, both private and public, constitute indispensable prerequisites to understanding of the forces affecting urban growth.

The Nature of Urban Planning

Planning for urban regions is as old as cities. The most ancient cities excavated by archeologists evidence street patterns and land uses which clearly show the effects of overall plans. As cities grew larger and more numerous, more complex planning processes became necessary in order to integrate the numerous individual and collective decisions affecting the patterns of urban growth. Now, city, metropolitan, and regional planning is a process involving the integration of inputs from many disciplines, and the adjustment of many goals and ideas, some of which may be mutually incompatible. Since planning is a process involving integration of many specialized fields, and since geography, as the discipline primarily concerned with the areal association of phenomena and activities, is an integrating discipline, it follows that geography and planning have much in common. Indeed, many geographers are finding interesting and productive careers in planning, and many planners, in turn, have found geographical insights and techniques invaluable. The boundary between geography as a discipline and city and regional planning as an applied field is very tenuous, with broad areas of overlap.[2]

Planning is, of course, concerned with much more than the spatial aspects of cities and regions; it embraces the totality of all of the decisions which shape the future. It is innovative, and thus is an art as well as a science. Architecture and civil engineering, as well as landscape architecture, have been traditional approaches to urban planning. Planning is concerned with man and society and therefore embraces the social sciences, including economics, history, anthropology, sociology, as well as geography. Planning is a process and therefore embraces systems analysis, psychology, and a wide variety of other disciplines concerned with behavior patterns. Plans must be carried out and therefore must be "sold"; public relations and the mass media also are involved. In short, the processes of planning and the prerequisite fields of knowledge are so vast and complex that no one person can be considered

[2] For further discussion of the relationships between geography and urban planning, see: Harold M. Mayer, "Geographers in City and Regional Planning," *The Professional Geographer*, VI (May 1954), 7-12; ———, "Urban Geography and Urban Transportation Planning," *Traffic Quarterly*, XVII, 4 (October 1963), 610-631; ———, "Geography and Urban Planning: Theory and Application," *Economic Geography*, XLII, 4 (October 1966), 282; ———, "Urban Geography and City and Metropolitan Planning," *Urban Research and Policy Planning*, ed. by Leo F. Schnore and Henry Fagin (Beverly Hills, Calif.: Sage Publications, Inc., 1967), pp. 221-238.

an over-all planner.[3] The professional organization of planners in the United States, the American Institute of Planners, defines its profession as "the unified development of urban communities and their environs and of states, regions, and the nation."[4] This definition was recently adopted; an earlier one was much more restricted in scope, being primarily concerned with physical development. Geography, as one of the disciplines contributing to the planning process, is, of course, also concerned with more than the purely physical; it is concerned with non-ubiquitous phenomena and therefore with the spatial aspects of intangible as well as tangible attributes of areas.

Inter-Governmental Coordination and Planning

We have seen, in preceding articles in this series, how the proliferation of cities and the growth and spread of urban population have been accompanied by the creation of an increasing number of governmental units. These include both general local governments—cities, towns, villages, and boroughs, depending upon the state—and special-purpose governments, such as school districts, junior college districts, sanitary districts, forest preserve districts, and many others. The spread of urban areas rarely coincides with the local governmental boundaries, and many of the problems associated with population and activity at urban densities extend over areas far beyond the limits of the local governmental jurisdictions. Thus there has been an increasing participation of state and federal governmental units in local affairs.

Inter-governmental coordination, although essential for the effectuation of plans for development of urban areas, is in itself a difficult process, because each of the governments, whether general or special-purpose, has vested interests in either a specific area or level or a special activity and is generally unwilling to abandon any such interests. The elected officials and staffs, furthermore, constitute a bureaucracy which tends to persist, once established. Among all of the levels and types of governments in the United States, only the school district has been characterized by a decrease in numbers and only because the optimal-sized school is beyond the ability of many small local school districts to finance and operate. There are, however, many other functions of government which could, perhaps to an equal or greater degree, be effectively carried on by fewer and larger units of government. One of the major problems in urban planning is the fragmentation of the urban areas into a phalanx of such governmental jurisdictions. The planner, as a professional, cannot do more than point out the possibilities of simplification of governmental structure; only the legislative bodies can produce the desired results, and often this would require changes in state and federal constitutions.

Nevertheless, there are some devices which are being tried in order to achieve inter-governmental cooperation and coordination in metropolitan areas, and, in turn, increase the effectiveness of the planning process.

Metropolitan government, as an overall device, is unpopular and probably unfeasible, in spite of the fact that in the nineteenth century several cities, notably Philadelphia, St. Louis, and San Francisco, consolidated city and county governments. In recent times Dade County (Miami), Florida, Davidson County (Nashville), Tennesee, and Duval County (Jacksonville), Florida have achieved some degree of city-county consolidation; in each instance, however, the consolidation is limited to certain functions, while others are retained by local municipalities within the respective counties. In Canada, several metropolitan areas, beginning with Toronto in the early 1950's, consolidated a number of functions into multiple-purpose—though not general-purpose—metropolitan governments, with other functions being retained by local municipalities.

In many instances, local governments which have insufficient areas or financial resources to provide their residents or businesses with efficient facilities and services have entered into joint arrangements for such facilities and

[3] Among the many discussions of the nature of planning, the following represent a few approaches: William I. Goodman and Eric C. Freund, eds., *Principles and Practice of Urban Planning* (2nd ed.; Urbana: University of Illinois Press, 1965); F. Stuart Chapin, Jr., "Foundations of Urban Planning," *Urban Life and Form*, ed. by Werner Z. Hirsch (New York: Holt, Rinehart and Winston, 1963), pp. 217-248; and many articles in *The Journal of the American Institute of Planners*, especially XXVIII, 2 (May 1962) issue.

[4] *Constitution* of the American Institute of Planners.

services with each participating local government sharing the costs. In other instances local governments enter into contracts with other governments for buying services, as, for example, supplying of water from a central city to suburbs, or fire and police protection being supplied to a small municipality by a larger nearby one. Finally, in recent years, Councils of Governments have been established in which all or some of the local bodies in urban areas cooperate, either informally or officially, in the joint planning of facilities, services, and legal controls involving problems which cross municipal boundaries, such as air and water pollution, airport approach zoning, land-use regulations and controls, and flood control.

Federal Participation in Local Planning and Development

The federal government has increasingly participated in the planning and development of public facilities, services, and programs which transcend local boundaries. This, of course, has met with resistance in many quarters because people fear the centralization of powers and loss of local autonomy. Nevertheless, there is an increasing realization of the necessity of giving up some local autonomy in the interest of larger regions, and one of the most difficult problems in city and metropolitan planning and administration is the determination of which problems can best be solved locally and which must involve actions that local governments cannot successfully undertake alone. A regional park of metropolitan importance is not the same as a local neighborhood park; a major university in an urban area requires a different level of planning than does a local elementary school, because its influence and service area is different; a major airport may have nationwide importance. Thus, just as there is a hierarchy of central places, there is a hierarchy of responsibilities by a hierarchically-organized set of governments, each with its own area of concern or jurisdiction.

The federal government has always been involved in the planning and operation of facilities and services of national importance, and the Constitution makes such operations mandatory. Interstate commerce is federally regulated, and increasingly it has been realized that local and interstate transportation are inseparable because of the common use of facilities. Suburban commuter trains use the same tracks as intercity frieght trains; highways carry both local and intercity traffic; rivers do not stop at the boundaries of cities or states. Welfare is as much a federal concern as a local one, for migration takes place across the boundaries of states and municipalities in response to differences in economic, social, and cultural opportunities.

In recent years metropolitan planning has been greatly stimulated by the federal government. During the 1930's many new social programs were initiated in attempts to overcome the effects of the Great Depression and to provide for the minimum needs of the underprivileged. Public housing, tried on a very small scale during World War I, was accepted, though with considerable resistance; in the thirties, highways and other public works were greatly expanded with federal funding, and home ownership was facilitated by the Federal Housing Administration and Veterans' Administration, which guaranteed lending institutions against the defaulting of their mortgages on homes.

The FHA and VA programs did not have major effects until after World War II, but since then they have greatly accelerated the deconcentration of many urban areas. Since these agencies were concerned not only with making low-interest long-term loans to individuals and families possible but also with minimizing the risks of default, they controlled much of the post-war urban expansion by making guarantees available to lending institutions for single-family detached homes in middle and upper-middle income suburban and peripheral areas and by withholding them in inner-city areas where both the needs and the risks were greatest. The preference for detached houses, and for owner-occupied homes rather than renter-occupied units, contributed greatly to the urban "sprawl" of the postwar period, and to the out-migration of middle-income families from central cities to suburbs. These were value judgments which, in retrospect, may not have been completely justified. They accelerated the "flight from blight" and, combined with the inability of central cities to expand their boundaries at the same rate as the expansion of the urban population, produced substantial losses of tax base to suburban areas at the same time that relative lowering of in-

come of inner-city residents created greater financial burdens on the central cities, which had increasing welfare loads and still had to operate many facilities and services for the metropolitan populations. The states and the federal government had to contribute increasingly to the financing of such facilities and services, while at the same time pursuing policies which accentuated the problems of the inner cities.

Urban Redevelopment

One of the most significant programs involving federal participation in local planning and development is the Federal Housing Act of 1949. Title I of that act is the basic law which has been responsible for redevelopment of parts of hundreds of cities. It is an attempt to arrest and reverse the out-migration of middle- and upper-income families and business enterprises, which provide economic support and tax bases for the central cities and for inner portions of the older suburbs, by making such areas competitive with private investment in land on and beyond the urban periphery.

In many of the older areas of cities, the street and subdivision patterns are obsolete, consisting of narrow lots and streets, and, paradoxically, having too many streets that cut through residential neighborhoods and take up excessive amounts of land although incapable of handling traffic requirements. The neighborhood environments are unattractive; buildings are deteriorated and not easily convertible to modern needs. In many instances there is chronic tax delinquency and no incentives for the owners to keep up maintenance on their properties because they can make excessive profits from substandard and overcrowded buildings. Furthermore, many of the owners believe—generally falsely—that as the central business districts expand they can further profit from the increased value of their properties. Commonly, too, many of the properties do not have clear titles, so that extensive title searches would be necessary in order to enable any ownership transfer to take place.

A developer seeking to operate in such older and deteriorated areas of cities would face problems of clearing title to the land, paying delinquent taxes, changing the zoning, obtaining vacation of some of the streets and dedication of new streets, negotiating with the owners of hundreds or thousands of individual small parcels, relocating the individuals, families, and businesses that occupy the site, demolishing the existing structures, relocating the utilities which may not be suitably situated for the new development, and then preparing the site for redevelopment. After all this is done, he still would not have an economically advantageous site, because the land costs, entirely aside from the costs of all the operations enumerated here, would be considerably in excess of the costs of equivalent land areas farther out from the center of the city. Furthermore, most of the older areas requiring redevelopment would be occupied by residents who are unable to afford the rents in more adequate housing elsewhere and would be seriously affected by any redevelopment, particularly because many such areas are occupied by members of minority groups who have long faced economic and social discrimination in the housing market and whose choice of residential location would be extremely limited. Also, few developers would willingly face the many problems associated with the uprooting of such people and the consequent ill-will that could be generated.

Title I enables large-scale developers to bypass many of these problems. A local agency assembles and prepares the site and makes it available to a developer or group of developers who agree to carry out a comprehensive plan for the area which is in conformance with a general plan for the vicinity. The "fair market price" of the land is paid by the redevelopment agency to the owners of the properties. If an owner is unwilling to sell at the price offered, impartial appraisers are called in, and, if he is still reluctant, the use of eminent domain —condemnation—is invoked, with fair compensation for the properties which are taken. The courts have, after much litigation in many cities, generally declared urban renewal to be a public purpose justifying the use of condemnation, even though the properties after redevelopment are to be in private ownership.

The price of the land paid by the redeveloper is called the "re-use value" and is, theoretically, equal to the price that he would pay for undeveloped land on the urban periphery. The public agency absorbs all of the costs of land assembly and clearance of the site. In addition, the local public agency also pays a portion of the cost of the land at the fair market value, the rest being contributed by the federal

government to the extent, usually, of two-thirds of the cost of site acquisition and clearance. Such contributions by the federal government may be in the form of loans or grants, while the local contribution does not necessarily have to be in cash. The latter can be, and typically, is in the form of the value of local facilities, such as schools, streets, utilities, and other facilities serving the site which are to remain in service after completion of the redevelopment, and also the value of the services rendered in the preparation of the plans for the public sector of the redevelopment operation.

Although Title I originally provided primarily for residential redevelopment, the provisions of the law were later modified so that the same general procedures and sharing of costs between local, federal, and private organizations have been applied to redevelopment projects which are predominantly or, in some cases, entirely for industrial and commercial uses. Title I has, for example, been extensively applied in the redevelopment of portions of the central business districts in a number of cities.

Physical rebuilding of extensive portions of cities has been accomplished through the powers of urban redevelopment, especially Title I, and also Title III of the same act, which provides for extensive participation of the federal government in the financing of public housing projects for low income families that cannot afford the minimum housing available on the private market.[5]

The removal of thousands of low-income people and families from areas subjected to urban redevelopment created population pressures elsewhere in the cities. Because of the fragmentation of metropolitan areas into numerous local governmental jurisdictions and the lack of provision, in most instances, for comprehensive metropolitan planning of relocation, the suburban areas were generally not available to the people who had to be evacuated. Furthermore, there was resistance to the influx of new populations into such outlying areas, as well as to communities within the city which previously did not have substantial members of minority groups among their populations. The result, in spite of mandatory provisions for making "standard" housing available to the evacuees, was considerable population pressure and development of tensions in many parts of the city, with consequent deterioration of those areas. It soon became evident that "projectitis," or the emphasis upon large-scale demolition and rebuilding, was not an unmixed blessing.

In 1953 an urban land economist, Miles Colean, published a small book entitled *Renewing Our Cities*, in which he pointed out that large-scale rebuilding, although it had its place, was not the answer to urban deterioration and blight, and that, if it was to be effective, it should be accompanied by many other programs to assure that redevelopment of portions of a city would not result in spreading of deterioration and blight elsewhere as the population pressures spread.[6]

The result was a broadening of the federal legislation, in the form of amendments to the Housing Act in 1954, including the first official use of the term *urban renewal.*

URBAN RENEWAL

Urban renewal, as distinguished from urban redevelopment, includes not only the latter, in the sense of involving extensive demolition and rebuilding, but also many other programs which emphasize conservation and rehabilitation of existing structures and neighborhoods.

As prerequisite for federal assistance, the government requires, under the 1954 amendment, a "workable program" to be prepared annually by each municipality, in which evidence is to be submitted to demonstrate that appropriate steps are being taken to assure against the spread of deterioration. These steps could, and commonly do, include such matters as modernization of the zoning and building codes with appropriate enforcement measures, improvement of protective services, comprehensive planning of land uses and transportation, and provision of an adequate supply of housing.

[5] For discussion of the pros and cons of urban redevelopment and other urban renewal programs, see two compilations of readings on those topics: James Q. Wilson, ed., *Urban Renewal: The Record and the Controversy* (Cambridge: The M.I.T. Press, 1966); and Jewel Bellush and Murray Hausknecht, *Urban Renewal: People, Politics and Planning*. Anchor Books (Garden City, N.Y.: Doubleday & Co., Inc., 1967).

[6] Miles L. Colean, *Renewing Our Cities* (New York: The Twentieth Century Fund, 1953).

The up-grading and protection of existing communities within cities also includes such measures as assuring citizen participation, through local and city-wide civic organizations, in the process of planning, and the education of the citizens in the desirability of maintaining the quality of their housing and other buildings. In order to avoid the over-emphasis upon individual large-scale projects, the federal government stimulated the preparation, under later legislation, of comprehensive city and metropolitan plans, shorter-range plans in greater detail (Community Renewal Programs or CRP's), and local plans for individual neighborhoods embracing not only projects but comprehensive actions in their vicinities (General Neighborhood Renewal Plans or GNRP's). Thus planning was brought down to the operating level; no longer was the preparation of a city plan a one-time operation; planning became a continuing part of the local government's functions. Finally, as an essential part of the planning process, most municipalities prepare and publish an annual public improvements program or capital budget for the ensuing five- or six-year period, so that the physical development of the city is scaled to the ability of the city and other agencies to pay for the contemplated improvements, and so that there is ample time to adjust the plans to avoid incompatibilities among the projects submitted by the various departments and agencies.

Thus, in the course of time, the emphasis in city planning has shifted from the purely physical overall concepts to operating instrumentalities of the city governments, with extensive participation by the states and the national government. The "city beautiful" movement of the late nineteenth and early twentieth centuries, inspired by publication of such civic-design-oriented plans as the Burnham and Bennett *Plan of Chicago* in 1909,[7] emphasized the civic facade: boulevards, parks and parkways, and civic centers. Later it was—in retrospect, naively—believed that amelioration of substandard housing conditions would eliminate much of the social pathology of cities and emphasis was upon "slum clearance," a rather negative approach in that it concentrated upon palliatives and not upon the final outcomes. Still later, and especially in the period immediately following World War II, the emphasis shifted to a more positive but limited approach: urban redevelopment. This was followed after 1954 by a combination of urban redevelopment with conservation, rehabilitation, and other measures, the entire package of programs and actions being subsumed under the designation *urban renewal*. Finally, in subsequent years, social programs received increased emphasis, along with programs for physical improvement and rebuilding of the cities, such as improvements in education—the Vista and "Head Start" programs constituting examples—and the "Model Cities" programs. The latter was originally conceived of as involving a limited number of demonstration areas in a relatively few cities in which comprehensive programs of physical development, social service, and economic programs were to be experimented with. Later, under the current federal administration, the concept is being broadened to include the entire areas of the designated cities.

The broadening of the concept of city planning has been accompanied not only by a change in the definition of the profession itself to include non-physical—social and economic—as well as physical aspects, but also by major changes in the nature of the organizations to prepare plans, carry out the plans, and subject them to frequent revision. Planning is not static; even the best plans will gather dust in the files if they are not living documents subject to review and revision as conditions change. The emphasis has shifted from the preparation of "master plans" to planning as a continuous process and an integral part of local government.[8] It is, as such, deeply involved in politics, and the planner, to be effective, must consider the political process as an integral part of planning. He must work not only with the public officials, but also with the public for whom—and, hopefully, with whom—the planning is to be done.

The increasing scope and effectiveness of the planning process is also manifest in the changing nature of the planning organizations.

[7] Daniel H. Burnham and Edward H. Bennett, *Plan of Chicago* (Chicago: The Commercial Club, 1909).

[8] A critical discussion of the planning operations in one metropolitan area is contained in: Alan A. Altshuler, *The City Planning Process* (Ithaca: Cornell University Press, 1965).

During the first two or three decades of the twentieth century, the planners were primarily experienced in physical design. Many of them were architects or engineers, and lawyers developed the legislation to encourage the preparation of plans and their effectuation. Commonly, they reported to citizen organizations which may or may not have had official status. The Plan of Chicago, previously mentioned, was sponsored by a private organization, and its publication resulted in the formation of a quasi-official citizens' commission appointed by the Mayor. For thirty years the commission functioned essentially as a lobbying group, promoting the individual projects which had been included in the plan.[9] Indeed, the organization was called the Chicago Plan Commission—note *plan* rather than *planning*. Not until 1939 was it brought into the city government, and subsequently it was again reorganized—in 1957 as the city's Department of City Planning, and in 1965 as the Department of Development and Planning. Thus, it evolved from a purely advisory group to a major city department and an important arm of the executive and legislative branches of the city in the formulation of policy. The history of planning in many other cities is closely parallel. Similarly, metropolitan planning, handicapped by the fragmentation of metropolitan areas into numerous local jurisdictions, has promise of becoming increasingly effective with the added powers recently obtained, principally under the impetus of the federal government, by metropolitan planning agencies. In the Chicago region, the Chicago Regional Planning Association, an unofficial agency, was concerned with assisting suburban communities and counties and in effectuating those portions of Burnham and Bennett's Chicago Plan which affected the areas outside of the central city. Following the creation of an official metropolitan planning agency, the Northeastern Illinois Metropolitan Area Planning Commission in 1957, the former Association was merged into it. In the New York region, the famous Regional Plan of the 1920's was largely effectuated by the Regional Plan Association—not reporting to any specific local government—and that agency has more recently prepared the Second Regional Plan.[10]

The Federal Government and Metropolitan Planning

In spite of the fact that effective overall metropolitan governments do not generally exist in the United States, there are new mechanisms for the preparation and effectuation of metropolitan comprehensive plans. These are very largely the result of increasing concern by the federal government with the nature, extent, location, and interrelations of the many projects and programs initiated and operated with federal funds.

For more than a decade, section 701 of the Federal Housing Act has provided for partial federal financing of the preparation of plans in smaller municipalities and in metropolitan areas. Originally, the national government would match local funds for planning in smaller cities, in counties, and in metroplitan areas. More recently, the 701 funds have become available more generally, and many communities have taken advantage of the opportunity to prepare comprehensive plans.

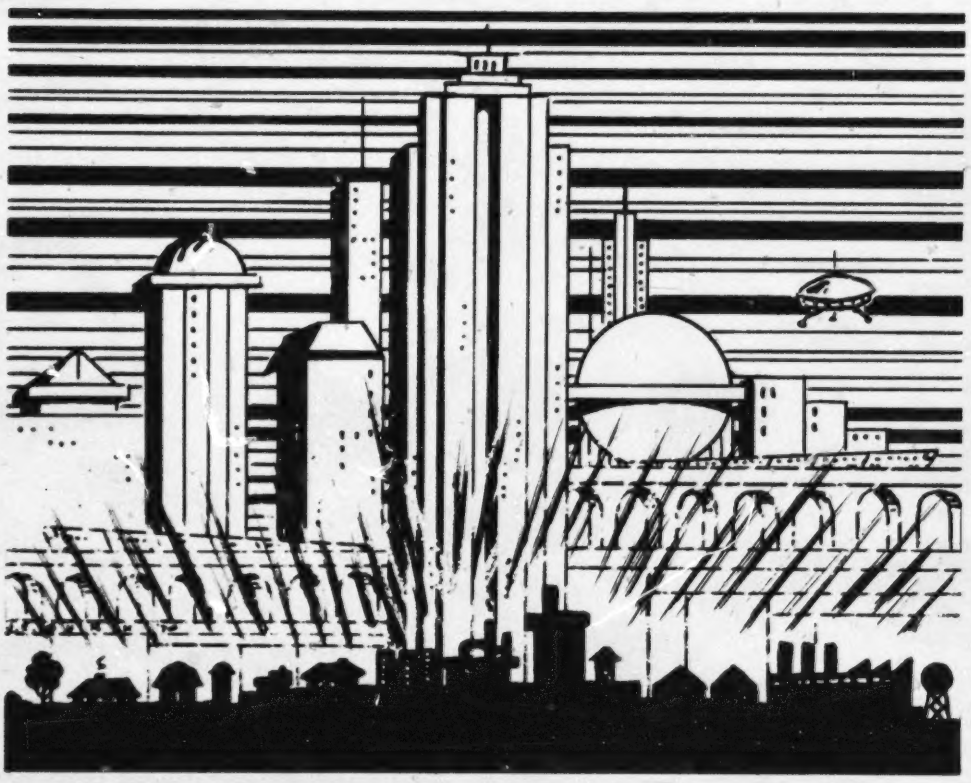
Increasingly, as the numbers and complexity of physical improvements in metropolitan areas grew, conflicts developed. Highway planners, for example, generally were not concerned with the effects of the highways upon the municipalities, communities, and neighborhoods through which they passed, nor were they involved in considerations of the interrelations between highways and other forms of transportation. In San Francisco, public concern over the disruptive effects and unsightliness of freeways led directly to termination of the freeway construction program and the initiation of BART, the Bay Area Rapid Transit system, which is now under construction.

Origin-destination traffic studies, commonly used before the mid-1950's for planning of highway networks in metropolitan areas, evolved later into comprehensive transportation-land-use studies, in which relationships among various land uses at different densities and distances apart were seen to generate dif-

[9] For history of the early years of the Chicago Plan Commission, see: Robert A. Walker, *The Planning Function in Urban Government* (2nd ed.; Chicago: The University of Chicago Press, 1950), pp. 223-274 and pp. 358-361.

[10] *The Second Regional Plan: A Draft for Discussion* (New York: Regional Plan Association, 1968).

ferent volumes and patterns of traffic, which were then projected in conformance with alternative proposed patterns of land use and development as an aid in selecting the best desirable and efficient pattern from among the alternatives.[11] Social values, as well as physical and economic efficiency, were increasingly considered.

Previously, many incentives were offered by the federal government for comprehensive metropolitan planning. For example, for a number of years financial aid was available to metropolitan areas for acquisition of open land to be devoted to forest preserves and other uses of low density. Beginning in 1965, such aid was extended to many other programs, including urban renewal, mass transit, highways, airports, water and sewer facilities, and many others, provided that they are in conformance with comprehensive metropolitan plans. In each metropolitan area, as prerequisite for financial aid in such improvement programs, the federal government now requires that a metropolitan planning agency be created and designated by the respective states to prepare and keep up-to-date comprehensive plans which include consideration of the interrelations among all such improvements. Funds under section 701 of the Housing Act were made available to help in the financing of such plans and in the operation of metropolitan planning agencies. In each instance, any local government desiring federal financial assistance for any project having metropolitan significance must secure approval from the metropolitan planning agency, which in turn must satisfy the federal government that the proposal is in conformance with a comprehensive metropolitan plan and not in conflict with any other proposal. Thus, metropolitan planning, previously weak, has prospects of becoming a significant part of the total process of urban and regional development.

[11] For discussion of transportation planning, see: Harold M. Mayer, "Transportation and Internal Circulation," *Journal of Geography*, LXVIII, 7 (October 1969), 390-405.